A Dissertation on

ROLE OF EXENTERATIVE SURGERY IN LOCALLY ADVANCED PELVIC TUMOURS

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BONAFIDE CERTIFICATE

Certified that the dissertation titled **"ROLE OF EXENTERATIVE SURGERY IN LOCALLY ADVANCED PELVIC TUMOURS*" is*** a bonafide work of the Candidate **Dr.G.GOVINDARAJ,** carried under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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CONTENTS

INTRODUCTION

Total pelvic exenteration is a radical procedure defined as the complete resection of the pelvic viscera and its draining lymphatic system. Ever since Brunschwig published his initial experience in 1948 about sixty years ago, the procedure has undergone a major evolution from being a desperate experimental procedure to a well established surgical procedure with curative intent for selected patients.

In an era of multimodal treatment and organ preservation, exenteration still maintains an important place in the armamentarium against advanced pelvic malignancy. The rationale for such an ultra-radical procedure is based on the observation by Eugene M Bricker, a pioneer in pelvic exenteration, along with pathologist Lauren Ackerman, radiotherapist Theodore Eberhart and Dr.Juan del Regato that certain cancers of the pelvic viscera possessed a propensity for remaining confined to the pelvic organs for a long time before they metastasize.

The classic examples are the cancers arising from the uterine cervix, vagina, vulva and rectosigmoid. Ovarian, prostate and to a lesser extent bladder and endometrial cancers most often spread beyond pelvis by the time adjacent viscera are involved.

Eugene M Bricker performed his first total exenteration on August 8, 1940. Bricker's patient was a 32 year old female with persistent carcinoma of cervix. The development of

ileal conduit by Bricker in 1950 for urinary diversion was a major advance in pelvic surgery.

Pelvic exenteration was reported by Brunschwig in 1948 as an especially radical surgical treatment for advanced and recurrent cervical cancer. It was described as “the most radical surgical attack so far described for pelvic cancer” and at the time had an operative mortality rate of 23%. In all cases, the ureters were transplanted to the colon proximal to a colostomy – the so called wet colostomy.

Cancers arising in the pelvis are often treated with multimodality therapies, including surgical resection and radiation. When these cancers recur, many may be locally advanced but still limited to the pelvis; however, prior treatment with high doses of radiation makes limited surgical resection a difficult undertaking fraught with complications. Furthermore, the response of tumors to chemotherapy within a previously radiated field is extremely poor. In some instances, the only opportunity for cure may lie in complete resection.

Pelvic exenteration is a salvage procedure performed for centrally recurrent gynecologic cancers. To a greater or lesser degree, the procedure involves en bloc resection of all pelvic structures, including the uterus, cervix, vagina, bladder, and rectum. Most candidates for this procedure have a diagnosis of recurrent cervical cancer that has previously been treated with surgery and radiation or radiation alone. In some cases, patients with recurrent uterine, vulvar, or vaginal cancers may benefit from pelvic exenteration. In general, patients with ovarian cancer are not candidates because of the distant pattern of spread associated with ovarian cancers.

Pelvic exenteration continues to be the only curative option in certain patients with centrally recurrent cervical, vaginal, or vulvar cancers. Since Brunschwig's time, improvements in critical care, antibiotics, hyperalimentation, and thromboembolism prophylaxis, accompanied by similar advances in surgical technique, including the use of stapling devices, separate urinary conduits, and pelvic reconstruction, have improved the morbidity and mortality rates associated with the procedure. Currently, operative mortality rates are 3-5%, the major perioperative complication rate is 30-44%, and the overall 5-year survival rate in patients who successfully undergo the procedure is 20-50%.

AIM

The study aims to analyze the various indications, preoperative evaluation, technique, morbidity, mortality and outcome of pelvic exenterations done at the **surgical oncology** department of **Government Royapettah hospital** and to compare the results with similar international series to evaluate the role of exenterative pelvic surgery in today's practice.

LITERATURE REVIEW

APPLIED ANATOMY

PELVIC SIDEWALLS

The sidewall of pelvis is formed by the hip bone, clad with obturator internus and its fascia. The obturator internus muscle arises from margins of obturator foramen and the obturator membrane. The origin extends posteriorly as high as pelvic brim and across the flat surface of the ischium to the margin of greater sciatic notch. On the ischial tuberosity, the origin extends down to the falciform ridge.

From this wide origin the muscle fibers converge fan-wise towards the lesser sciatic notch and makes a right angled bend around the lesser sciatic notch to enter the gluteal region. As the muscle emerges into the gluteal region, it is reinforced by additional muscle fibers from the lesser sciatic notch. These are the superior and inferior gamelli. They blend with the tendon of obturator internus to get inserted into the medial surface of greater trochanter. The muscle is covered with a strong membrane, the obturator fascia. This is attached to bone at the margins of the muscle and fuses below with the falciform process of the sacrotuberous ligament on the ischial tuberosity. The tendinous arch of levator ani slopes across the obturator internus fascia. The pelvic cavity is above this line and the ischioanal fossa is below it. Obturator nerve and vessels pass through a gap in the superior aspect of the obturator internus muscle

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PELVIC FLOOR

The pelvic floor consists of pelvic diaphragm through which the urethra and anal canal in both sexes and vagina in females pass.

The muscles of the pelvic floor are levator ani and coccygeus. They arise in continuity from the body of pubis, obturator fascia and spine of ischium to get inserted into the coccyx and postanal plate.

Levator ani consists of two parts, iliococcygeus and pubococcygeus. The anterior fibers of pubococcygeus arising from the body of pubis, swing more medially and more inferiorly around the anorectal junction to join with fibres of the opposite side and the anal sphincter. This part of the muscle is called puborectalis and forms a sling which holds the anorectal junction angled forwards. The most medial fibres of pubococcygeus forms the levator prostate in males and pubovaginalis in females. The iliococcygeus arises from the tendinous arch of the obturator fascia and ischium to insert into the coccyx. Although the iliococcygeus does not arise from ilium, its name derives from its former origin on the iliac bone near pelvic brim. This is still the site of origin in most mammals. In man the origin has descended down the sidewall of pelvis bringing the tendinous arch with it.

The postanal plate where the levator ani gets inserted is a musculotendinous structure between the anal canal and coccyx on which the terminal rectum sits. It consists of the presacral fascia, the tendinous plate of pubococcygeus, the muscular raphe of iliococcygeus and posterior parts of puborectalis and the external anal sphincter.

Coccygeus is best thought of as ischiococcygeus as it arises from the ischial spine and gets inserted into the side of coccyx and lowest piece of sacrum.

PELVIC FASCIA

Consists of parietal and visceral layers. The parietal pelvic fascia is a strong membrane on the pelvic surface of obturator internus. It fuses with periosteum at the upper margin of obturator internus and at the medial margins of the anterior sacral foramina. The visceral pelvic fascia consists mainly of loose areolar tissue around the pelvic viscera. It is condensed around neurovascular bundles supplying these viscera to form ligaments such as the lateral cervical ligament, Waldeyers fascia behind the rectum, pubovesical and puboprostatic ligaments.

PELVIC VESSELS

Pelvic walls and viscera are supplied by internal iliac artery and drain into tributaries of internal iliac veins. Arteries and veins lie within the parietal pelvic fascia. The common iliac artery bifurcates at the pelvic brim opposite the sacroiliac joint. Internal iliac artery divides into a short posterior and a longer anterior division. The posterior division has three branches that supply the parietal wall. These are the iliolumbar, lateral sacral, and the superior gluteal arteries. The anterior division has nine branches. Three associated with the bladder are the superior vesical which is the first branch, obliterated umbilical artery which is the continuation of superior vesical, and the inferior vesical arteries.

Three other visceral branches are the middle rectal, uterine and vaginal arteries. Three parietal branches are the inferior gluteal, obturator and the internal pudendal arteries.

INTERNAL ILIAC VEINS

Begins above the greater sciatic notch by the confluence of gluteal veins with others that accompany the branches of internal iliac artery. It joins the external iliac vein on the medial surface of psoas major to form the common iliac vein. Apart from the tributaries that correspond to arteries, the internal iliac vein receives tributaries from the rectal, vesical, prostatic, uterine, and vaginal venous plexuses. The presence of these venous plexus can cause severe haemorrhage if injured. The internal iliac vein communicates with the vertebral venous plexus through the lateral sacral veins. There are no valves in the pelvic veins. Sudden increase in abdominal pressure can drive blood up into vertebral plexus to the posterior intercostal veins and by azygos veins into the superior vena cava bypassing the diaphragm. By this way, secondary carcinomatous deposits may enter the vertebrae from primary growth in any of the pelvic viscera.

PELVIC NERVES

Obturator nerve (L2, 3, 4)

The obturator nerve is a branch of the lumbar plexus formed within the substance of psoas major. It is the nerve of the adductor compartment of thigh. The obturator artery and vein converge to the obturator foramen, in which the nerve lies highest against the pubis with the artery and vein beneath it in that order.

Sacral plexus

A part of L4 and all of L5 form the lumbosacral trunk. It descends to join the upper four sacral nerves in the formation of the sacral plexus.

Nervi erigentes

It is the parasympathetic pelvic splanchnic nerve arising from S2,3,4. The nerve causes erection.

Sacral sympathetic trunks

The sympathetic trunks cross the pelvic brim behind the common iliac vessels and run into the concavity of the sacrum.

Inferior hypogastric plexus

The inferior hypogastric plexus is an autonomic plexus on the sidewall of the pelvis on each side.

INDICATIONS FOR PELVIC EXENTERATION

Pelvic exenteration is primarily indicated for centrally recurrent cervical cancers in patients who have received definitive radiation therapy. The procedure is appropriate in patients who meet criteria for any recurrent pelvic tumor if a chance of cure exists with the procedure.

CERVIX

The extensive use of screening examinations and cervical cytologic studies has made it possible for most cervical cancers to be detected at an early stage. In a certain number of cases, however diagnosis does not occur until the disease is widespread throughout the pelvis, representing a daunting treatment challenge. Because of the anatomic features of the pelvis and the location of cervical cancer, the urinary system and the rectum are often involved. When the cancer persists, or recurs in the pelvis, despite adequate radiation therapy, exenterative surgery is often necessary to achieve local control of the disease. 1/3rd of patients with invasive carcinoma of the cervix have residual or recurrent disease, and central recurrence develops in abut 25% of them.

Approximately 30% of cervical cancer patients will ultimately fail after definitive treatment. Regardless of treatment modalities, more than 75% of recurrence occurs within 3 yrs from diagnosis. The reported 5 year survival rates of patients with treatment failure are between 3.2% and 13%. Concurrent chemoradiation achieves significantly better outcome than radiation alone in patients with recurrences after primary radical

hysterectomy. Isolated paraaortic lymph node metastases and local recurrence confined to cervix were associated with better outcome in failure after definitive radiotherapy. When definitive radiotherapy or surgery plus adjuvant radiotherapy has failed, pelvic exenteration is usually necessary for those who had central relapse with clear pelvic side wall and free of distant metastases. For patients who have recurrence involving the irradiated pelvic wall, pelvic exenteration is usually not an option for curative intent. Intraoperative radiotherapy (IORT), combined operative radiotherapeutic treatment (CORT) and laterally extended endopelvic resection (LEER) have been used in such situations with some success. Chemotherapy alone is basically palliative. Generally combination chemotherapy could attain higher response rates with no significant improvement in overall survival than CDDP alone.

Early stage IB and IIA cervical cancer can be cured on an average rate of 80% with either radical surgery or definitive radiation, yet 30 – 50% of patients with stage IIB to IV will ultimately fail. Recurrent cervical carcinoma remains a tough clinical problem.

Patients with recurrent cervical cancer after primary treatment with surgery and radiation or radiation alone are faced with few options because chemotherapy is at best palliative, and the 1- and 5-year survival rates are, respectively, 15% and less than 5%.

Treatment of recurrent disease depends on previous treatment, site or extent of recurrence, disease free interval and patient's performance status. According to present consensus, patients after surgical therapy should be treated with chemoirradiation and central pelvic relapses following primary or adjuvant radiation should undergo surgery. Radical hysterectomy may be adequate for small, less than 2 cm lesion, but most patients

will need pelvic exenteration when there is no evidence of distant metastases. In all cases of tumor involvement of pelvic wall exenteration is abandoned. However novel surgical salvage therapy to a selected subset of patients with locally advanced and recurrent cervical carcinoma involving the pelvic wall, including pre irradiated patients for whom treatment with long term survival prospects has been beyond the scope of current therapeutic options, is performed in the form of laterally extended endopelvic resection (LEER).

Patients with recurrent cervical cancer after radiation therapy usually present with bleeding, hematuria, or pelvic pain. In some cases, the first sign of recurrence is the discovery of hydronephrosis or abnormal cytology on routine follow-up. Before proceeding with the surgical procedure, confirming a recurrence with a pathologic specimen obtained by biopsy is essential. In patients who have previously had high doses of pelvic radiation, physical examination is notoriously unreliable and bleeding and pain may be related to radiation changes rather than recurrent disease. The clinical triad of leg edema, ureteral obstruction, and leg pain is almost pathognomonic for disease extending to the pelvic sidewall and is generally considered a contraindication to surgery.

RECTOSIGMOID

Pelvic exenteration has been done chiefly for treatment of advanced rectosigmoid primary disease with varying results. Approximately 10% of patients with rectal cancer present with advanced disease that is technically unresectable at the time of diagnosis. These patients are usually treated with preoperative radiation in an attempt to shrink their tumors sufficiently to permit standard abdominoperineal resection. It appears that preoperative radiation can produce a measurable decrease in tumor size but is insufficient to control residual disease at the site of tumor fixation. For patients with tumors that remain technically unresectable after radiation, the outlook is even more dismal; their median survival period is 6 to 18 months, with a 5 year survival rate of less than 5%. However, pelvic exenteration has a cure rate of 30 – 41%. About 30 – 50% of all patients who have primary resection for rectosigmoid cancer have a local recurrence. In 15%, the recurrence is found only in the pelvis; there is no evidence of distant metastases. The major challenge of pelvic recurrence is tumor fixation to the sacrum or pelvic sidewall, which requires extended pelvic exenteration called as composite pelvic exenteration.

For primary rectal cancer, the consensus is that, high-risk, locally advanced tumors should be treated first with chemoradiation and exenteration reserved as a salvage procedure.

VAGINA, VULVA, ENDOMETRUM AND OVARY

Vaginal carcinoma represents the second most common gynecologic lesion treated with exenteration. Squamous cell carcinoma accounts for most cases. The proximity of vaginal

cancer to the bladder and rectal wall makes these structures especially frequent sites of involvement.

Pelvic exenteration is useful for treating advanced or recurrent squamous carcinoma of the vulva when the disease extends to the urethra, vagina, or anus. The exenteration should include an en bloc resection of the vulva with bilateral inguinal lymphadenopathy.

The use of pelvic exenteration for locally advanced and recurrent ovarian cancer was described in an early report by Barber and Brunschwig. The results were not favorable.

BLADDER AND PROSTATE

Rarely carcinoma of the urinary bladder is too extensive for radical cystectomy and may require anterior or total pelvic exenteration. Advanced prostate carcinoma has also been treated by pelvic exenteration but is probably better managed by radiation or hormonal therapy.

RARE TUMOURS OF PELVIC ORGANS

In general sarcomas of the female genital tract are not appropriate for radical surgery because of their tendency toward early metastatic spread by the hematogenous route.

EVALUATION

As early as 1950, Bricker stated that “if we are unable to leave a patient in a functional state compatible with a comfortable existence, we are not morally justified in performing this operation”

Case selection is paramount to success. Early identification of recurrence is associated with better chances of resectability. Post-therapy evaluation consists of clinical history, physical examination, pap smear, and serum tumor markers: squamous cell carcinoma antigen(SCC-Ag) and CEA for squamous cell carcinoma; CA125 and CEA for adenocarcinoma; and imaging studies.

A good physical examination must include local and distant nodal regions because supraclavicular lymph node metastases especially in locally advanced uterine cervix cancers are not rare. The importance of pelvic examination under anesthesia (EUA) in the evaluation of resectability cannot be overemphasized. Although tumor adherence to limited portions of the pelvic bone structure is not a contraindication to resection, extensive areas of tumor fixation is especially in the lower pelvis. Examination of anaesthetized patient allows a careful examination of the rectum and pelvic organs which is often limited by pain or discomfort in an awake patient. Examination under anesthesia permits a free exchange of views regarding the level and extent of tumor fixation to the pelvis as well as invasion into adjacent organs. Also, teaching of fellows, residents, and medical students may be conducted without discomfort and embarrassment to the patient.

Progressive leg edema and back pain are signs of parietal pelvic wall involvement beyond resectability. Apparent neural involvement such as sciatic nerve impairment is a warning sign of extrapelvic tumor involvement. However, these neural signs may be the result of previous radiotherapy or chemotherapy or both and thus must be corroborated by adequate imaging studies.

Urinary tract obstruction is a relative contraindication for pelvic exenteration. The ureteric obstruction occurring at the ureterovesical junction is often 20resectable because of its central location. Upper pelvic ureteric obstruction where the ureters travel in close proximity to the common iliac vessels and the pelvic sidewall is more likely to be associated with unresectable disease.

The first step in the approach to treating a patient with a biopsy-proven central recurrence is an exhaustive search for distant metastatic disease and evaluation for comorbid conditions. The initial surgical exploration involves a further search for disseminated disease and necessitates a complete assessment of intraperitoneal and retroperitoneal areas that would preclude proceeding with exenteration. This task can be accomplished by laparoscopy in selected patients.

LAB STUDIES

- Preoperative laboratory evaluations should include the following:
    - CBC count
    - Comprehensive metabolic panel
    - Coagulation studies
    - Type and cross match for blood products

- Because most patients have received prior treatment, including pelvic radiation therapy, an increased likelihood exists of preoperative anemia and, occasionally, neutropenia. A large number of patients also have poor nutritional status and electrolyte abnormalities.

- Other testing depends on the existence of other comorbid conditions in individual patients.

IMAGING STUDIES

The purpose of performing preoperative imaging studies is to rule out distant metastases, to establish resectability or in the case of suspected persistent disease, to attempt to differentiate between fibrosis and cancer recurrence. Image directed biopsies may be ultimately required in cases in which tumor recurrence is neither clinically visible nor palpable and therefore not within the reach of a transperineal, transvaginal, or transrectal needle core biopsy. When histologic proof of recurrent malignancy is unavailable, or when biopsies are negative for cancer, short term follow up with imaging studies may be prudent.

The mainstay of imaging for preoperative assessment of operability is CT scanning of the chest, abdomen and pelvis which can identify multiple visceral metastases that are one contraindication to exenteration for cure. A potential exception to this contraindication is patients with recurrent rectal cancer and 21resectable pulmonary or hepatic metastases.

A word of caution about pelvic exenteration for palliation is necessary. Although several publications attempt to justify this operation in the name of palliative care, patients who

are incurable by pelvic exenteration should not as a rule be subjected to such a morbid procedure. However some important exceptions in which palliative exenteration may be advisable include

1. Young and good risk operative candidates who have limited tumor burden
2. Unresectable distant disease along with symptomatic pelvic recurrence that is amenable to complete resection.
3. Patients with infected pelvic advanced malignant disease which is unresponsive to percutaneous drainage or antibiotics.
4. Fistulas and obstruction that can be relieved by exenterative pelvic surgery.
5. Patients with resectable pelvic malignant disease who have transfusion dependent tumor bleeding and uncontrolled pain of central or visceral origin but not pelvic parietal pain.

ENDORECTAL ULTRASONOGRAPHY

Endorectal ultrasonography has become an essential component of the pretreatment evaluation of transrectal tumor invasion with an accuracy of over 90%. It is not as reliable as a determinant of the extent of disease in the case of recurrent pelvic cancer. When exenteration is being considered as a primary form of treatment, MRI, PET and even pelvic EUA are more diagnostic than EUS. By the time the rectal cancer necessitates exenterative surgery, knowing the degree of transrectal invasion is beyond the value of ultrasonography.

MRI

MRI for primary and recurrent pelvic cancer has been studied extensively. Although it does not replace CT imaging, MRI improves the visualization of the relationship between the advancing edge of the tumor and pelvic fascial planes and muscles. MRI is also useful in 23assessing resectability, differentiating fibrosis from tumor invasion and adds further anatomic detail to CT in upto40%. MRI has shown a sensitivity of 97% and a specificity of 98% compared with 70% and 85% for CT.

PET

PET scan can reliably detect distant metastatic disease undiscovered by CT scan. Also PET has been more accurate than CT in detecting locally recurrent rectal cancer changing clinical management in 10 to 61% of patients with recurrent rectal cancer.

Combining pelvic CT and MRI imaging also is useful in predicting the likelihood of a complete resection, especially in cases with pelvic sidewall tumor involvement.

- The use of imaging studies in evaluating a patient for pelvic exenteration depends on the initial assessment of tumor size and location.

- Most patients need a CT scan of the abdomen and pelvis and a chest radiograph. Other imaging studies may be used as needed for evaluation of potential areas suspicious for metastatic involvement.

    - Chest radiograph or CT scan

- CT scans of abdomen and pelvis
- MRI to evaluate musculoskeletal involvement
- Liver ultrasonography to evaluate for metastatic disease
- Bone scan to evaluate for metastatic disease
- Positron emission tomography (PET) scanning: PET scanning remains investigational in the evaluation of cervical cancer but may be very useful in excluding small areas of distant metastatic disease.

Other Tests:

- Psychosocial assessments of patient's ability to adequately manage postoperative physical and psychological issues
- Assessment of comorbid conditions

Psycho-social counseling

The mental condition of the patient should be thoroughly investigated before exenterative surgery is considered. The patient should be fully informed about the benefits, objectives and risk of the procedure and must demonstrate an understanding and acceptance of all possible consequences. Emotional stability and a positive attitude are essential.

Diagnostic Procedures:

- Biopsy confirmation of recurrent cancer

Histologic Findings: Most cervical cancers are squamous cell carcinomas, though the incidence of adenocarcinoma of the cervix is rising. Rare histologic types are occasionally encountered and include adenosarcomas, uterine sarcomas, and cervical or vulvar melanomas.

CONTRAINDICATIONS

Absolute contraindications include peritoneal metastasis, metastasis to retroperitoneal nodes and skip metastasis to bowel. Spread to an adjacent area of small bowel does not preclude exenteration if the peritoneal cytologic study yields negative results. Skip metastases to the bowel however is an absolute contraindication. Relative contraindications include direct tumor invasion of adherent bowel loops and hydroureter or hydronephrosis.

Determination of the extent of resection is based on sidewall involvement, infralevator versus supralevator, and anterior versus posterior versus total exenteration.

Absolute Contraindications	**Relative Contraindications**
Distant metastases	Age over 70 years
Peritoneal carcinomatosis	Low pelvic ureteric obstruction
Circumferential pelvic involvement	Periosteal tumor fixation
Proximal pelvic ureteric obstruction	Moderate co morbidity
Sciatic nerve pain	Severe malnutrition
Tumor fixation with bony invasion	Non axial recurrence
Progressive leg edema	Short disease free interval
Major comorbid conditions	Multiple lymph node metastases
Para-aortic nodes	
Mentally ill patients	

SURGERY

Preoperative details:

Preparation

An antibiotic and a mechanical bowel preparation are administered on the day prior to surgery. The stoma sites are marked on the skin before surgery. The ideal location for an ileostomy and colostomy should be marked by an enterostomal therapist before the patient goes to the operating room. These sites are generally located halfway between the umbilicus and anterior superior iliac spines and must be situated so that there is a ring of normal skin around the stoma large enough to accommodate the ostomy appliances. Because previously irradiated skin can get ulcerated or necrosed in the presence of stoma or appliance, the radiation ports that were used should be avoided.

Prophylactic antibiotics are administered in the operating room, and pneumatic calf compression units are placed on the legs prior to the anesthetic induction. Prepare and drape the potential operative field, including the entire abdomen, perineum, vagina, rectum, and thighs.

Position

The patient is positioned supine, with the lower extremities maximally abducted and resting either straight in long-leg traction units, as described by Spratt et al (ski position) or with hips fully flexed in the dorsal lithotomy position with knees flexed at 90 degrees in leg holders.

The procedure is typically performed with the patient in the lithotomy position. The patient's legs are carefully placed in Allen or other supported stirrups. The correct positioning places the weight on the feet and includes padding to ensure protection from neurologic injury and to prevent compartment syndrome.

The tip of the coccyx must extend beyond the end of the folded table. The sacrum must be well padded to prevent pressure necrosis and to promote exposure of the posterior perineum. If a sacral resection or hemipelvectomy in combination with a total pelvic exenteration is anticipated, a change to lateral decubitus position may be necessary.

With the patient under general anesthesia, the surgeon should perform a final bimanual pelvic examination to reacquaint himself with the tumor's relationship to adjacent viscera or pelvic side wall. In women, obliteration of the vulva is achieved with a continuous suture from just above the clitoris to the postanal region. In patients with middle or high lesions, the labia majora can be preserved for perineal closure. The patient's skin is prepared from the breasts to the knees with a thorough perineal and vaginal scrub included.

Central venous line:

Adequate vascular access must be available in order to ensure that rapid fluid and blood product resuscitation can be instituted if needed. Vascular access also allows invasive cardiovascular monitoring as indicated.

Intraoperative details:

Exploration

Through a low midline incision extending from 2 cm above the umbilicus to the pubic symphysis, the abdomen and pelvis are thoroughly explored. If the upper end of the incision extends further into the epigastrium, packing of intestines becomes difficult and if the lower end of the incision does not expose the edge of pubic symphysis, mobilization of the pelvic viscera is difficult. The liver, peritoneal and bowel surfaces, aortic and pelvic nodal groups, and pelvic sidewall are carefully evaluated.

Biopsies of any suspicious sites and nodes are obtained and examined by frozen section. A formal paraaortic lymph node dissection provides no prognostic benefit. Distant and peritoneal metastases are absolute contraindications to exenteration. The obturator fossa and the region lateral to the external iliac vessels are explored to determine whether extension beyond the psoas muscle has occurred. In some circumstances like sarcoma, resection and reconstruction of the involved external iliac vessels may be justified. Major vessel invasion by squamous cell carcinoma and adenocarcinoma, however, is regarded as a contraindication to exenteration because cures are rare.

The final determinant of resectability is the exploration of the extraperitoneal pelvic spaces and sidewall structures and the peripheral attachments of the cardinal and uterosacral ligaments. The peritoneum from the sacral promontory along the brim of the pelvis to the bladder is opened. This is done first on the side where the tumor is closest to the sidewall. Another exploratory maneuver that is often helpful in defining tumor extent

is mobilization of the urinary bladder from the symphysis pubis and the rectum from the anterior surface of sacrum. These actions permit better assessment of the mobility and lateral extent of the tumor and may allow determination that the lesion is inoperable before transaction of the ureters, colon and the visceral blood supply.

Exenteration is aborted in significant proportion of candidates who have reasons for aborting the procedure that include peritoneal disease, nodal metastases and so forth.

Controversy exists regarding whether to proceed in the presence of nodal metastasis, which reduces the survival rate to 5%, or direct tumor invasion of any adherent loop of sigmoid colon or small bowel. The issue of sidewall involvement is important in determining 29resectability because the goal is to achieve negative surgical margins. In some centers, the availability of intraoperative radiation therapy (IORT) allows resection with close margins, but grossly positive margins confer an extremely poor prognosis. The process of dissecting open avascular spaces allows for further determination of resectability with adequate margins.

The pararectal, paravesical, and Retzius spaces are developed under direct visualization, and the cardinal ligaments are isolated by this method. The pelvic retroperitoneal spaces are opened, and the ureters and internal and external iliac vessels are identified and tagged as necessary. This allows identification of pelvic nodal metastasis, dissection of the ureters, and visualization of vessels, which may require ligation to control or prevent excessive bleeding.

When a total pelvic exenteration is to be performed, the sigmoid colon is divided to maintain the specimen in the center of the pelvis. In operations for rectum, the inferior mesenteric artery is divided at its origin to ensure an adequate lymphadenectomy. The small intestine and the stapled proximal end of the divided colon are packed into the upper abdomen. The caecum is partly mobilized and held cephalad with the folded edge of laparotomy gauze under the blade of a Deaever's retractor. A 5 – 10 degree Trendelenberg position is helpful and should be requested before intestinal packing is done. If too much packing or force is applied, physiologic changes may occur as a result of an abnormally elevated diaphragm, occlusion of the hepatic veins or IVC, impaired blood flow to the intestines, or compression of the aorta or vena cava by the retractors. Careful positioning of packs and retractors is more important than great force in attaining necessary exposure.

Only one important somatic nerve, the obturator nerve, actually lies on the visceral side of the parietal layer of the pelvic fascia. This fascia can be incised over the nerve., thereby separating it from the central pelvic tissue without exposing the neoplasm. Occasionally the proximity of the tumor necessitates the sacrifice of this nerve to ensure an adequate margin around the lesion. Unilateral division of the nerve results in little disability, but the disability may be considerable when the division is bilateral.

Before proceeding with lateral dissection, it is helpful to mobilize the rectum from the presacral space. In patients with rectal tumors, it is best to divide the mesorectum sharply, avoiding blunt dissection that may leave behind residual disease or perforate the tumor bearing rectal segment. When the posterior rectal wall is not involved, blunt dissection to

the tip of the coccyx is permissible. It is important to stay anterior to the presacral veins to avoid troublesome bleeding. Similarly anterior blunt dissection of the prevesical space is simple and useful as long as the periurethral venous plexus near the urogenital diaphragm is not disturbed.

With the lateral dissection, the rectum and bladder are mobilized. There are no lymph nodes lateral to the genitofemoral nerve lying on the psoas muscle. Thus, the parietal layer of the endopelvic fascia is divided medial to the genitofemoral nerve, thereby preserving the nerve. The parietal endopelvic fascia is then reflected medially. It is contiguous with the vascular sheath of the common and external iliac vessels. The sheath is dissected off these vessels. The testicular or ovarian vessels and round ligament are divided.

The ureters are transected 3 – 4 cm distal to the crossing of the external iliac artery. It is preferable to divide the ureters later in the procedure after the lateral dissection has been completed bilaterally. This is done for two reasons: It generally represents a “point of no return” and it allows continuous measurement of urinary output and avoids leakage of urine into the operative field for a longer time.

The pelvic fascia is reflected from the psoas muscle to the lateral side of the external iliac artery. The fascia is reflected from the dorsal surface of these vessels to the obturator internus muscle and arcus tendineus. The obturator nerve is identified and protected by reflecting it laterally. The obturator vein and artery are identified passing through the obturator foramen and are divided. The visceral branches of the internal iliac vessels are ligated and divided. If the tumor is close to the hypogastric vessels, they are also ligated.

Care must be taken to avoid the superior gluteal artery that originates on the deep or lateral surface of internal iliac artery near its origin.

The bladder attachments are transected next. The peritoneal incision that was made lateral to the external iliac vessels and medial to the genitofemoral nerve is extended toward the internal abdominal ring and onto the lower edge of the midline abdominal incision. The areolar tissue in the prevesical space is dissected away from the pelvic side of the pubis, staying adjacent to the pubic peritoneum.

The rest of the lateral pelvic dissection depends on the condition of the perivenous tissues and identification of the lumbosacral trunk. This trunk composed of the fourth and fifth lumbar nerve roots, is situated dorsal and lateral to the obturator nerve lying adjacent to the caudal fibers of the obturator internus. Once it has been identified, the other sacral roots should be avoided by continuing the dissection medially and downward.

After the remaining vascular structures have been transected, the extent of the dissection along the pelvic surface of levator ani muscle is determined by assessment of lateral extent of neoplasm. When the levator ani has been circumferentially demonstrated, the rectum mobilized to the coccyx, and the bladder mobilized to the periurethral region, the perineal dissection begins.

Perineal dissection

For total exenteration in women, the perineal incision extends from the base of clitoris to behind the anus, just lateral to the labia minora or majora. The amount of skin sacrificed

is determined by the type and proximity of the neoplasm. For cancers extending low into the vagina, vulva, or perineum, a wider area of skin should be removed.

In men, the incision extends from the base of the scrotum to the coccygeal area. The urethra is ligated and divided. The urethra is brought out through a subscrotal tunnel to maintain the continuity of the en bloc dissection. In women the urethra is removed en bloc with the specimen.

After the subcutaneous tissues are divided, the ischium is identified by palpation, and the perineal fascia overlying the ischiorectal fat is incised medial to the ischium. The levator ani fibers are detached from the pelvic insertions. The levator ani is grasped between the index and middle fingers and transected on both sides of pelvis about a finger breadth from its origin on the arcus tendineus. Finally, the retro pubic periosteal insertions are divided and the specimen is removed through the perineum.

The empty pelvic cavity is checked for hemostasis. There are generally two principal bleeding points: The transverse perineal artery and the inferior rectal artery, both of which are branches from the internal pudendal artery in the pudendal canal. If possible the dissection should not enter this canal. The arteries are rarely a source of difficulty. If the veins are torn, they may bleed persistently, particularly in the following areas: the pre sacral veins, the obturator vein which can retract into the obturator foramen, between the sacral nerve roots from the retracted branches of the internal iliac vein, along the pudendal canal, and behind the symphysis pubis.

Occasionally there may be persistent hemorrhage from the deep pelvic vessels that can be controlled only by gauze packing. Early recognition of the need for packing prevents additional serious blood loss. If packing must be done, a rubber or plastic sheet (2x3ft) is folded to lie within the pelvis like a sack whose opening is at the perineal wound. Inside the sack, gauze pads are tightly packed to fill the pelvis completely and exert lateral and posterior pressure on it. Although such packing is rarely necessary nowadays, it can provide life saving hemorrhage control. Packs are left till clot retraction occurs.

The perineal wound is closed in two layers. The colostomy is then created. Urinary diversion is done.

The empty pelvis is frequently the source of considerable morbidity, especially in patients who have had radiation therapy. Procedures for filling in the empty pelvic cavity are now an important component of reconstruction in patients undergoing exenteration. Sometimes an omental flap fills most of the pelvic cavity. Other methods that can be used include placement of absorbable or permanent mesh at the pelvic inlet or of pedicled myocutaneous flaps or free flaps using microvascular reconstruction.

LAPAROSCOPY

Staging laparoscopy for abdominopelvic malignancy before laparotomy has a definitive place in the modern surgical armamentarium. The most compelling reason to use laparoscopy is because the finding of miliary peritoneal implantation or a cytological smear showing malignant cells in peritoneal fluid or lavage neither of which is recognizable in imaging studies constitutes a categorical contraindication to pelvic

exenteration for cure. Staging laparoscopy is thus advised in all patients before exenteration in whom it is technically feasible.

From a technical view point, there is no impediment to an oncologically sound en bloc dissection of the entire pelvic viscera and its associated lymphatics. In fact, laparoscopy provides better visualization of deep pelvic recesses than open surgery using deep pelvic retractors. At present, laparoscopic pelvic exenteration for locally advanced pelvic cancer cannot be advocated as the preferred operative approach.

Experiences with pelvic exenteration have shown that tactile sensation plays an important role in guiding the operation, especially when portions of the pelvic viscera may be preserved. The advancing edge of the tumor can be best ascertained by palpation of the viscera as dissection progresses. Although the gross margin required for Ro resection is generally 2 cm, the failure to anticipate the required tissue resection margins can make a potentially curative resection into a palliative one.

Although staging laparoscopy has been used primarily for upper abdominal malignancy, the use of this procedure has been reported by Kohler and colleagues in patients with gynecological malignancies who are being considered for pelvic exenteration. In this study 50% of patients were ineligible for pelvic exenteration on the basis of laparoscopic findings

TYPES OF PELVIC EXENTERATIONS

1. Total pelvic exenteration

2. Modified pelvic exenteration

3. Extended pelvic exenteration

TOTAL PELVIC EXENTERATION

Total pelvic exenteration is the removal of the uterus, cervix and vagina along with the urinary bladder and urethra anteriorly and the rectum and anal canal posteriorly.

MODIFIED PELVIC EXENTERATION

There are four main types of modified pelvic exenterations. They are 1. Anterior pelvic exenteration 2. Posterior pelvic exenteration 3. Anterior exenteration with proctectomy and 4. Supralevator pelvic exenteration.

ANTERIOR PELVIC EXENTERATION

In an anterior pelvic exenteration, the bladder, lower part of ureters, reproductive organs, draining lymph nodes, and pelvic peritoneum are removed. An en bloc resection maintains the rectum in situ because the posterior vaginal wall and uterus serve as margins for resection. Urinary diversion is done as in standard pelvic exenteration.

This type of exenteration is done for carcinoma of bladder involving the cervix and vagina, primary cervical or vaginal carcinomas with extension into the bladder and extensive vulvar carcinomas involving both the periurethral and vaginal regions.

POSTERIOR PELVIC EXENTERATION

In women, this procedure includes resection of the rectogenital organs, an end colostomy, and preservation of the bladder and ureters. This operation is suitable for low rectal carcinomas not amenable to low anterior resection with a coloanal anastamosis and confirmed invasion of the posterior vaginal wall sufficiently extensive to require near total vaginectomy and en bloc resection of the uterus.

ANTERIOR EXENTERATION WITH PROCTECTOMY

This procedure is indicated in men with bladder tumors extending to the middle or upper rectum, prostatic carcinomas or sarcomas involving a portion of the rectal wall. In women the procedure is appropriate for tumors of the bladder or internal genitalia with limited extension into the middle or upper rectum. Following resection, rectosigmoid anastamosis is done and urinary diversion is done as usual using ileal conduit.

SUPRALEVATOR EXENTERATION

In this procedure, the pelvic organs are excised at the level of the levator muscles, preserving the lowest portion of rectum and anus as well as the urogenital diaphragm. All coloanal anastamosis should be protected by either a diverting colostomy or a loop ileostomy. The splenic flexure should be mobilized and the inferior mesenteric vein divided at the lower edge of pancreas to provide sufficient mobility for a tension free coloanal anastamosis.

EXTENDED PELVIC EXENTERATION

This procedure involves removal of a part of the bony pelvis also. This is also called as composite pelvic exenteration.

LATERALLY EXTENDED ENDOPELVIC RESECTION (LEER)

Laterally extended endopelvic resection includes the internal iliac vessel system, endopelvic part of the obturator internus muscle, coccygeus, iliococcygeus, and pubococcygeus muscles into the exenteration specimen. Complications, disease free and overall survival rates and postoperative quality of life scores of patients with sidewall disease are comparable to those with central disease treated with standard exenteration.

RECONSTRUCTION

Rectal anastamosis

The decision to perform an end-sigmoid colostomy or a low rectal anastamosis is based on the level of the resection, the length of the rectal stump, and the extent of other concomitant procedures. A low rectal anastamosis can usually be accomplished using the circular end-to-end anastamotic stapling device. Reports have evaluated the complications associated with a rectal anastamosis at the time of pelvic exenteration, and the overall incidence of anastomotic leaks or fistula formation is 30-50%. A protective colostomy or omental wrap has not been found to have a significant impact on the incidence of successful healing by some studies. Recent data suggest that a higher leak

rate occurs in patients undergoing concomitant procedures such as IORT and continent urinary diversions.

Urinary diversion

Several options exist for urinary diversion, and the choice of continent versus noncontinent urinary diversion is based on assessment of the patient's ability to care for a continent pouch and availability of right colon and ileum with the ileocecal valve. The best option for noncontinent diversion is an ileal urinary conduit in which the ureters are implanted in an isoperistaltic manner into a segment of small bowel, one end of which is brought out as a cutaneous stoma. Other options are to use the transverse colon, the jejunum or the sigmoid colon. The advantages of ileal conduit are the ease of reconstruction, improved stomal preservations, greater flexibility, greater length to reach the abdominal wall even in obese individuals, adequate blood supply, and a convenient stomal location on the right lower quadrant. It is also associated with low incidence of infection and metabolic abnormalities, thus preserving the renal function. The main disadvantage is that bowel segments have been previously irradiated, thereby increasing the complications of ureteral stricture, fistulas and stomal necrosis. If significant radiation injury to the small bowel is observed at surgery, other options should be considered.

Transverse colon conduits have gained considerable popularity. The advantages are that it can be used in previously irradiated patients as it rarely lies in the field of irradiation, the bowel anastamosis also lies outside the irradiated pelvis, thereby having less complications compared to ileal conduits. Colon conduits are less likely to have stomal

complications. It can be used in obese patients with short ureters. The stoma can be placed anywhere on the anterior abdominal wall.

Jejunal conduit is rarely used as the complication rates are higher. The most common complication is the electrolyte imbalance, known as the Jejunal syndrome. Similarly the sigmoid colon conduits are also not used nowadays. The main disadvantage is that marked radiation changes are seen in previously irradiated patients.

The continent pouch uses the right colon as a low-pressure reservoir, with the ileum, ileocecal valve, or appendix specially configured to create the continence mechanism. A variety of continent pouches with small variations have been described. Kock was the first to introduce the low pressure reservoir created by detubularisation of the bowel using a segment of ileum. The most widely used ileocolonic continent reservoirs include the Miami pouch, Indiana pouch, and the Mainz pouch.

Complications associated with both continent and noncontinent urinary diversions in women who are gynecologic oncology patients have been reported by several authors. A continent urinary diversion allows the patient to have only a single ostomy bag, or none at all, and it can be successfully accomplished in patients with gynecologic cancer. Early complication rates range from 12-53%, and long-term complication rates from 33-37%. The reoperation rate is 6-8%.

Pelvic reconstruction

The complication of pelvic exenteration can be very troublesome due to the residual pelvic defect responsible for a high incidence of postoperative small intestinal obstruction and fistula formation. Most patients who undergo pelvic exenteration will benefit from placement of well vascularised flaps in the residual pelvic space to block entry of bowel, revascularize the irradiated pelvic cavity walls, decrease the occurrence of pelvic infections, fistulae, and chronically open perineal wounds.

Omentum is commonly used to fill the pelvic cavity. Among myocutaneous flaps, rectus abdominis flaps are used for the vaginal and pelvic reconstruction. It is done at the time of radical pelvic surgery. The flap is designed and elevated after removal of the pelvic organs. It is important to make sure that the inferior epigastric vascular pedicle was not divided during the pelvic resection. If it was, the contralateral rectus abdominis is used. If both the vessels were divided, a gracilis reconstruction is done.

Vaginal reconstruction

Several methods for vaginal and pelvic reconstruction have been described. An omental flap can be accomplished, generally with minimal morbidity, and serves to carpet the raw exposed surfaces of the exenterated pelvis. Myocutaneous grafts, including rectus and gracilis muscle flaps, can be brought into the pelvis and perineum to create pelvic support and a neovagina. Split-thickness skin grafts have also been used to create neovagina. The gracilis V-Y advancement flap is widely used for vulvar reconstruction and resurfacing of perineum.

RECENT ADVANCES

Controversy continues regarding the appropriate selection of patients for exenteration and the use of IORT, combined operative radiotherapy (CORT), preexenteration chemotherapy, concomitant continent urinary diversion, and low rectal anastamosis avoiding ostomies.

IORT

Intraoperative radiotherapy in its broadest sense refers to the delivery of radiation at the time of an operation. There are two methods of such delivery of radiation. One is the Intraoperative electron radiotherapy using external beam radiotherapy and the other is the HDR – IORT using high dose rate brachytherapy. Both these IORT methods evolved with the attempt to achieve higher effective doses of radiation while dose-limiting structures are surgically displaced.

IOERT

For patients who have recurrences involving the pelvic wall, pelvic exenteration is conventionally not an option for curative intent. However Monge-Martinez et al reported outcomes in 67 patients treated with intraoperative electron beam therapy (IOERT). The 10 years in field control rates were 92.8% in primary and 46.4% in recurrent tumors. 10 years overall survival rates were 58% and 14% respectively.

Appropriateness of IORT should be determined by the surgeon and radiation oncologist in the setting of a joint preoperative consultation whenever feasible. The dose and energy of IOERT depend on the amount of residual disease after maximum resection and on the external beam RT already given before surgery. The IOERT dose is 10 – 12.5 Gy for microscopic residual disease and 15 – 20 Gy for gross residual disease. Doses upto 25 –

30 Gy can be given for those patients who have not received any radiation. The biologic effectiveness of single dose of IOERT is considered equivalent to 1.5 to 2.5 times the same total dose of fractionated EBRT. Peripheral nerve is the principal dose limiting normal tissue for IOERT in the pelvis and retroperitoneum. Hence all patients are given an informed consent about possible nerve related side effects.

Because of the physical limitations of the electron beam and finite diameter of the electron beam applicator, IOERT may be unsuitable for treatment of sites deep in the inferior pelvis, subpubic location and some areas of lateral pelvic side wall. The disadvantages of IOERT are

1. Expensive to have a dedicated linear accelerator in the operating room.
2. Requires transporting of the anaesthetized patient to the radiotherapy room if a dedicated machine is not available.
3. Dosimetry is similar to EBRT and does not allow dose escalation within the target volume or surface.

HDR – IORT becomes the modality of choice for these difficult situations. This method of using HDR – IORT after surgical resection of disease at pelvic sidewalls is called Combined Operative Radiotherapy (CORT).

CORT

Whereas 25 to 50% of selected patients who relapse centrally in irradiated pelvis can be salvaged by exenteration, post irradiation recurrence infiltrating the pelvic sidewall generally has been fatal.

Combined operative radiotherapy has been developed to treat recurrent gynaecological malignancies infiltrating the pelvic wall unilaterally. The surgical part consists of i) staging laparotomy/ lymphadenectomy, ii) maximum tumor resection at pelvic wall with only a microscopic margin(R1) preserving the bony pelvis and the neurovascular support of the leg, and exenteration of infiltrated central pelvic organs, iii) implantation of guiding tubes on the residual tumor/tumor bed on the pelvic wall, iv) pelvic wall plasty with muscles, musculocutaneous and omental flaps for modulation of the therapeutic index for a second high dose radiation of the pelvic wall, v) operative reconstruction of bowel, bladder and perineovulvovaginal functions. Radiation is performed as interstitial high dose rate brachytherapy through the implanted tubes.

CORT has been evaluated in the University of Mainz medical school, Mainz, Germany between April 1989 and December 1994. A total of 48 patients were treated. At a median follow up of 33 months, the 5 year survival was 44%. Overall local control rate wsas 68% nom patient died as a consequence of the treatment. Age of the patient, state of the resection at the pelvic wall (R1 vs. R2) and recurrent tumor size independently influenced tumor progression after CORT in this series.

CORT appears to be a feasible innovative treatment with long term survival potential and acceptable quality of life for selected patients with post irradiation gynecological tumor recurrence infiltrating the pelvic wall.

Advantages of HDR – IORT are that hypoxia and sublethal damage repair are less of an issue because of longer treatment time. Higher central dose can be achieved and there is less risk to normal tissue. However the disadvantages are inability to do homogenous implants due to adjacent vessels and curved pelvic surface and inability to displace dose limiting organs for prolonged interval.

Potential Differences between IOERT and HDR – IORT

S.No	Factors	IOERT	HDR-IORT
1.	Actual treatment time	2- 4 minutes	5 – 30 minutes
2.	Total procedure time	30 – 45 minutes	45 – 120 minutes
3.	Treatment sites	Accessible locations	All areas
4.	Surface dose	Lower	Higher
5.	Dose at depth of 2 cm	Higher	Lower
6.	Dosimetric homogeneity	<10% variation	>100% variation

MATERIALS AND METHODS

All the patients who had undergone pelvic exenteration surgery in the surgical oncology Department of Government Royapettah hospital were taken up for analysis. Total number of patients who had undergone this procedure was 39. Out of these, 20 patients had undergone surgery in the period between September 2005 and May 2008. The remaining 19 patients had undergone surgery before this period from 1996 to 2005. The records of these patients were analyzed retrospectively and the patients were followed up regularly.

The pre operative evaluation of these patients consisted of a thorough clinical examination, routine blood and urine examination, chest radiography, Ultrasonography of Abdomen and Pelvis, CT scan of Abdomen and Pelvis and Examination under anesthesia (EUA). Selected patients were additionally evaluated with MRI and Cystoscopy. All the patients underwent a biopsy and pathological documentation of the disease was done. All the patients were counseled about the outcome and the stoma care and the relatives were explained about the procedure. Written informed consent was obtained from all the patients.

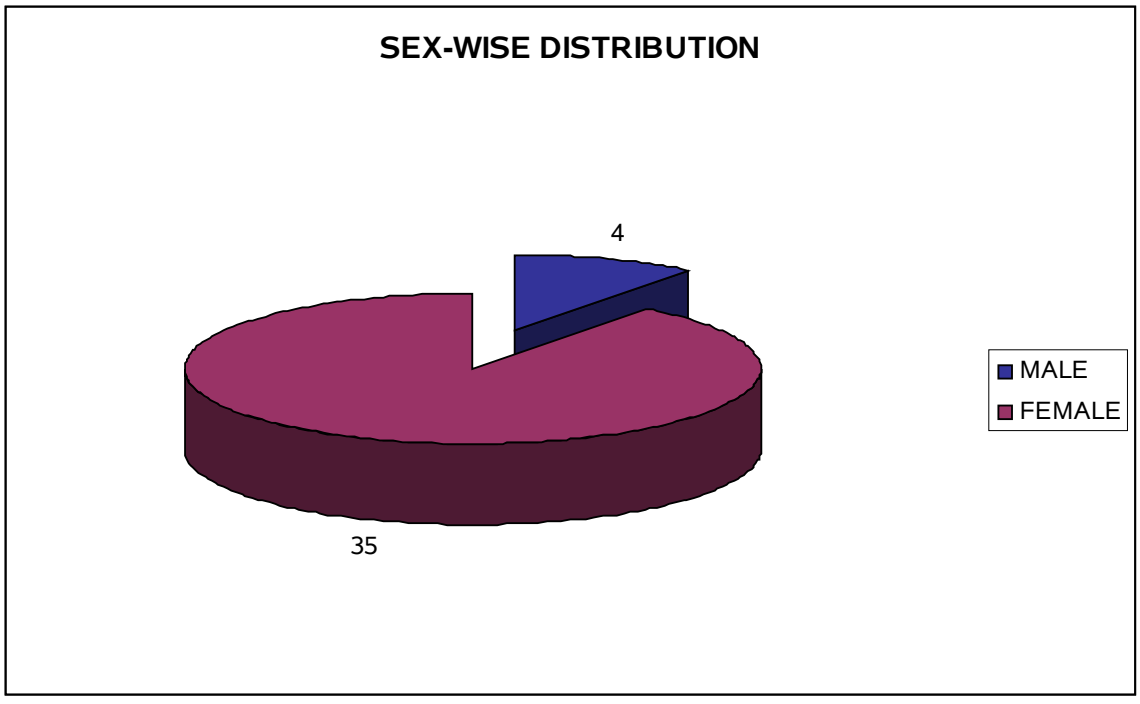
Patients who were not willing for surgery or those with contraindications for surgery and those considered medically unfit for surgery were excluded from the study. Patients who underwent laparotomy but had inoperable disease were also not included.

The various indications, the types of exenterations performed, types of reconstruction procedures used, the postoperative complications and patterns of recurrence were analyzed. All the patients were followed up once a month in the first year after surgery, once in two months during the second year, every three months during the third year, once in six months upto five years and annually thereafter. During follow up thorough clinical examination and annual ultrasound abdomen and chest radiography were performed. Symptomatic patients were further evaluated with CT scan. Survival was analyzed using Kaplan Meier curve. Results were compared with international series published in the literature.

OBSERVATION & ANALYSIS

Totally 39 patients who had undergone pelvic exenteration in the Department of Surgical Oncology at Government Royapettah Hospital were taken up for analysis. Out of these, 35 were females and 4 were males. The majority of our patients were females because the commonest indication for which pelvic exenteration was done in our series was carcinoma cervix.

MALE	FEMALE
4	35



Age of the patients ranged from 21 years to 72 years. Old age was not considered a contraindication for pelvic exenteration in our series. However, Age has often been considered a contraindication to radical exenterative surgery in many reports. A 1992

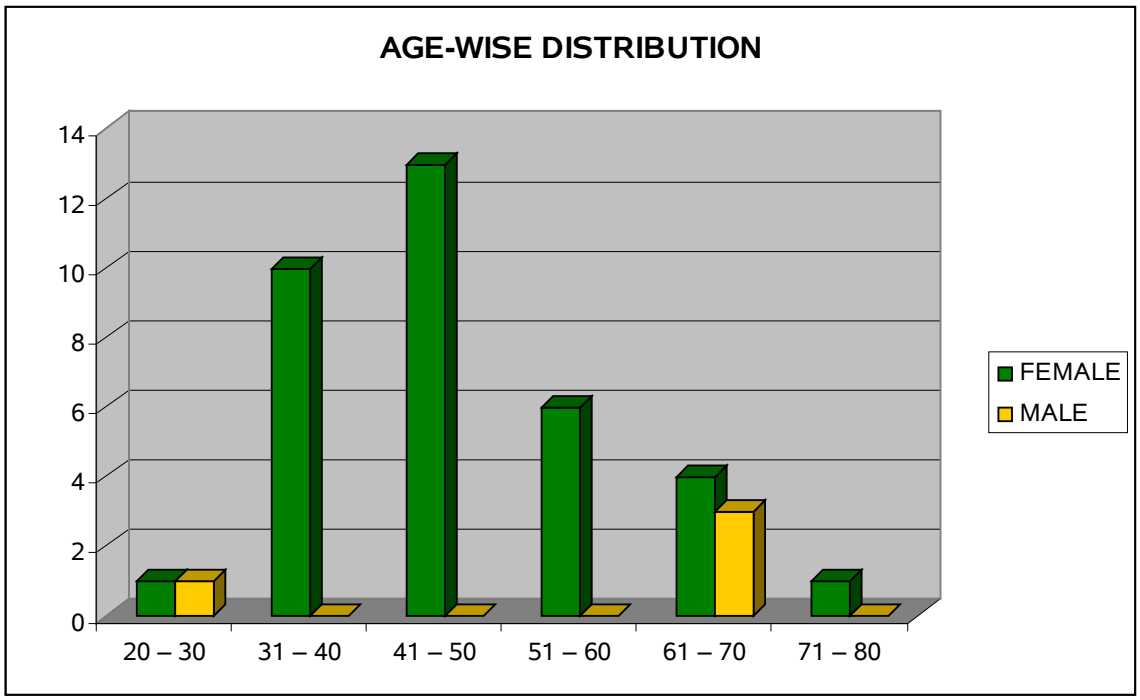
report from M.D. Anderson cancer centre reviewed the outcome in 63 patients who were 65 years of age or older and found that their operative mortality was 11% as compared with 8.5% in younger patients. The 5 year survival rate cited for older patients was 46% and 45% for younger patients.

The authors concluded that the morbidity and mortality levels in their elderly patients were comparable to those reported in previous studies of younger patients and that the 5 year survival periods were similar in the two groups, and age could not therefore be considered a contraindication to exenteration.

In our series also, the postoperative morbidity in the elderly age group of above 60 years was comparable to that of the younger age group. The average age of our patients was 47.7 among females and 54.0 among males. Majority of our patients were in the 41 – 50 age group. Total number of patients above 60 years was 8, with 5 females and 3 males. The results in this subgroup were comparable to that of the younger age groups. The age wise distribution of patients in our series is as shown below.

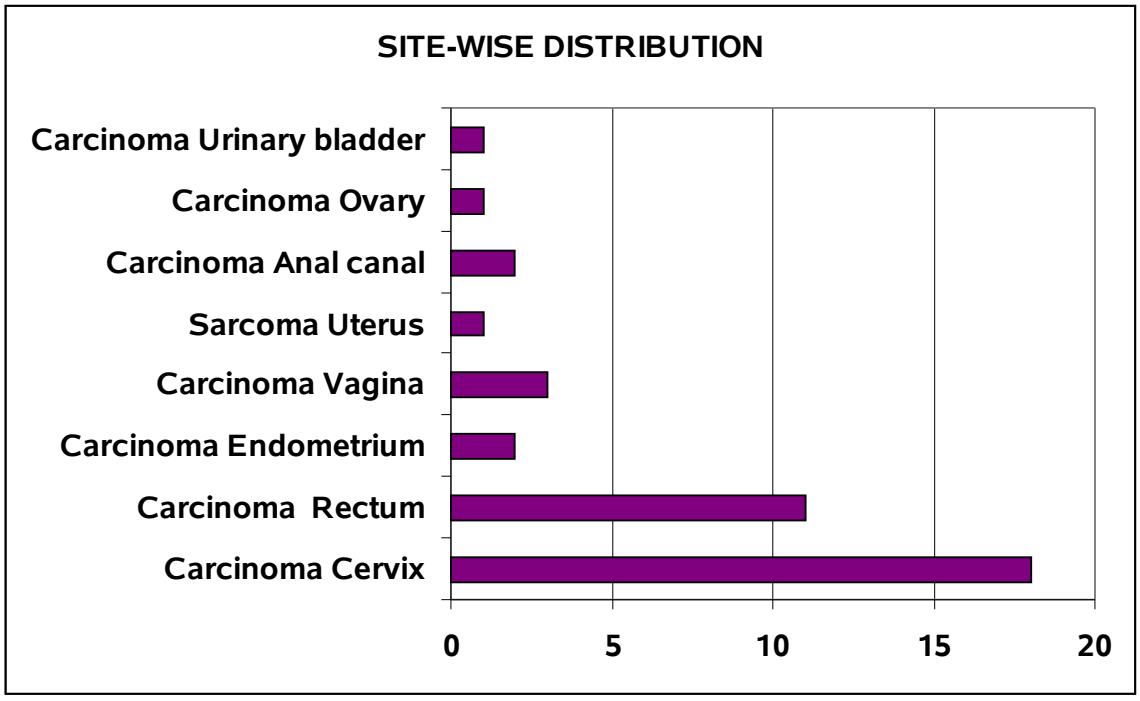
AGE GROUP	FEMALE	MALE
20 – 30	1	1
31 – 40	10	0

41 – 50	13	0
51 – 60	6	0
61 – 70	4	3
71 – 80	1	0
TOTAL	**35**	**4**



The various indications for pelvic exenteration in our series were for residual or recurrent disease in locally advanced pelvic malignancies after radiation and/or chemotherapy. The total number of cases of carcinoma cervix were 18, carcinoma rectum were 11, endometrial carcinoma were 2, uterine sarcoma was 1, carcinoma vagina were 3, carcinoma anal canal were 2, carcinoma ovary was 1 and carcinoma of the urinary bladder was 1.

Diagnosis	Total Number of cases	percentage
Carcinoma Cervix	18	46.1%
Carcinoma Rectum	11	28.2%
Carcinoma Endometrium	2	5.1%
Carcinoma Vagina	3	7.6%
Sarcoma Uterus	1	2.5%
Carcinoma Anal canal	2	5.1%
Carcinoma Ovary	1	2.5%
Carcinoma Urinary bladder	1	2.5%
Total	**39**	

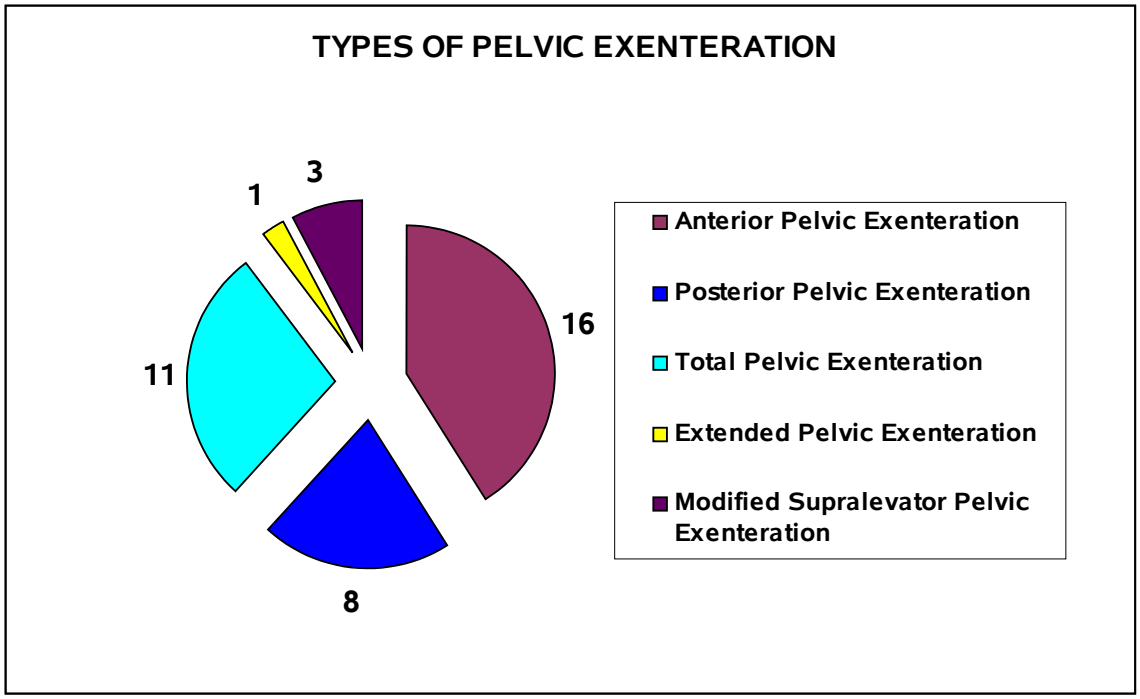


Carcinoma cervix was the most common disease in our series and carcinoma of the rectum was the second most common. In a 10 year review of the Memorial Sloan-Kettering cancer centre, the primary disease site and initial treatment in patients undergoing pelvic exenteration for recurrent or persistent gynecologic carcinomas is shown in the table below.

Site	No.of patients	Surgery	Radiation	Surgery +RT	Surgery +Chemo
Cervix	51	12	35	4	0
Vagina	5	0	5	0	0
Vulva	4	3	1	0	0
Endometrium	2	0	0	1	1
Ovary	2	0	0	0	2
Total	**64**	**15**	**41**	**5**	**3**

Various types of exenterations were performed in our series. Of the 39 patients, 16 underwent anterior pelvic exenteration, 11 underwent total pelvic exenteration, 8 underwent posterior pelvic exenteration, 3 underwent modified supralevator pelvic exenteration and 1 patient underwent extended pelvic exenteration.

Type of exenteration	**Number of cases**	**Percentage**
Anterior Pelvic Exenteration	16	41.0%
Posterior Pelvic Exenteration	8	20.5%
Total Pelvic Exenteration	11	28.2%
Extended Pelvic Exenteration	1	2.5%
Modified Supralevator Pelvic Exenteration	3	7.7%
Total Number of cases	**39**	



ANUSUYA 39 / F
CD NO 95 / 05
PROF RR, GRH

ILEAL CONDUIT AND COLOSTOMY

MODIFIED PELVIC EXENTERATION

TOTAL PELVIC EXENTERATION

VESICOVAGINAL FISTULA

ANTERIOR PELVIC EXENTERATION

PELVIC RECONSTRUCTION WITH OMENTUM

For urinary and fecal diversion, the different methods used were ileal conduits, wet colostomy and double barrel colostomy. Pelvic floor reconstruction was done using Omentum for most of the cases. For those who underwent anterior pelvic exenteration, ileal conduit was the only method of urinary diversion adopted in our series. However for one patient the conduit had to be revised and converted into a colonic conduit due to post operative complication. For those who underwent posterior pelvic exenteration, fecal diversion was done through colostomy and for those who underwent total pelvic exenteration, urinary and fecal diversion were done through two separate ostomies consisting of colostomy and ileal conduit or as a single ostomy through wet colostomy or double barrel colostomy.

While using double barrel colostomy the distal end of the colon was turned on itself like a 'turn bull' colostomy and the ureters were dunked into the distal segment. The opening for urinary diversion was placed above the fecal opening to avoid fecal contamination of the urinary tract.

The ureters were dunked into the ileal conduit or the colon as the case may be instead of mucosal anastamosis. A few seromuscular stitches were placed to fix the ureters to the bowel segment. This method provided the advantage of avoiding an anastamosis and the resultant complications such as anastamotic leak or stenosis. Moreover, the excess ureter that hangs inside the bowel segment, even if sloughs off, does not add to the morbidity. As most of the cases have received pelvic radiation, the distal ureter that has compromised blood supply, is more likely to slough off and this complication was avoided in our series by this dunking method. Another advantage of this technique is that in the postoperative period, if a mucus plug obstructs the stoma, the excess hanging distal ureters get folded due to back pressure and avoid reflux of urine into the upper urinary tract.

The urinary complications were less in the ileal conduit group than the wet colostomy group. In the 3 patients who underwent modified supralevator exenteration, sphincters were preserved, continuity restored and ostomy avoided.

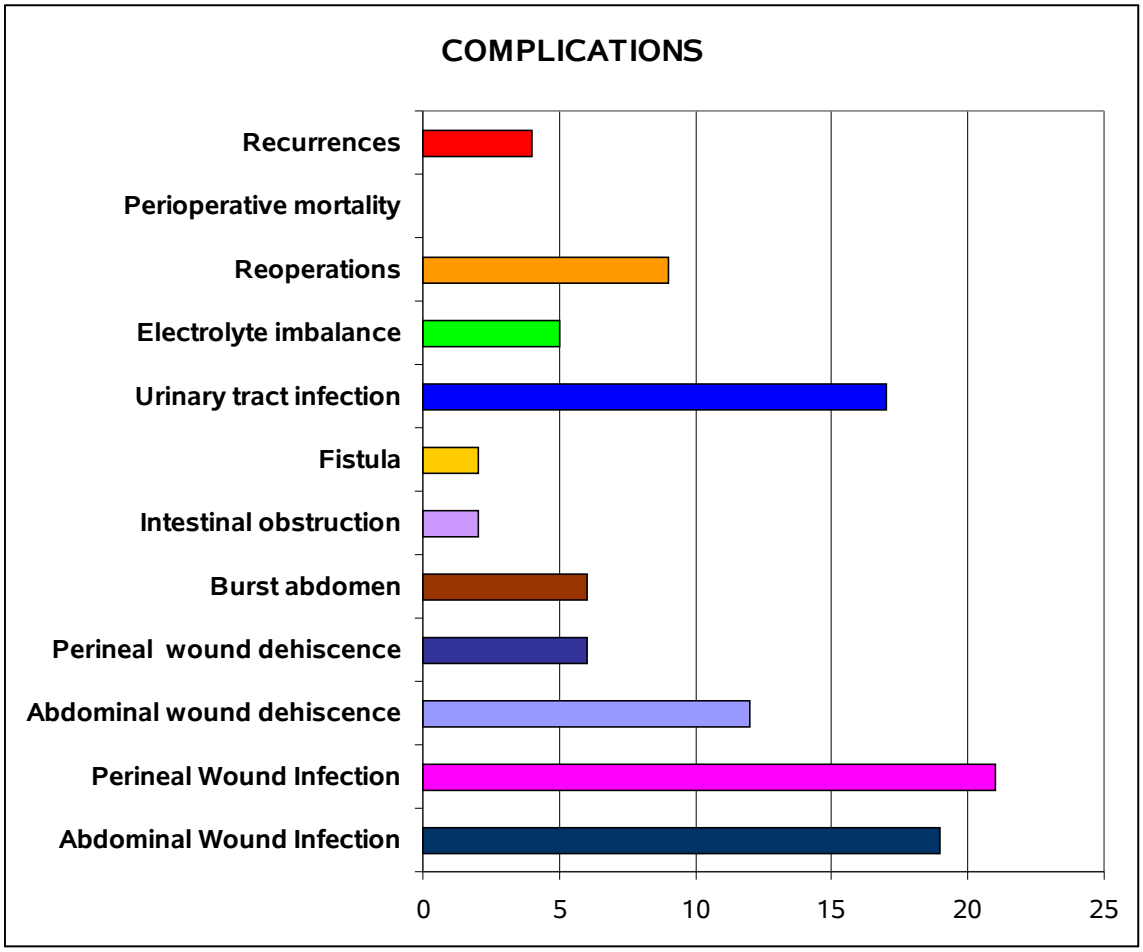
Pelvic reconstruction was done using omentum. As almost all our patients underwent surgery after irradiation, this was an essential component of pelvic exenteration. This procedure avoided small bowel complications in our patients. However 3 patients (7.6%) developed perineal wound complications. Two patients developed perineal fistula. In one

patient the fistula was from the ileal conduit and she had urine draining through the perineal fistula 5 months after the surgery. She underwent revision of the conduit and a colonic conduit was used. This patient later developed soft tissue recurrence in the pelvis after a disease free interval of 33 months and was given chemotherapy. She is still alive with the disease. In the second patient, enterocutaneous fistula developed and fecal material was draining through the perineal fistula. At laparotomy, she was found to have densely plastered bowel loops in the pelvis. Exclusion of the involved bowel segment was done and ileostomy done for diversion. This patient died in the postoperative period following the second surgery and her disease free interval was 12 months. One patient developed perineal wound dehiscence and herniation of the small bowel through the perineal wound. This patient refused any surgical intervention and was managed conservatively. The perineal wound healed well.

The post operative complications observed ranged from minor wound infections to burst abdomen in the early postoperative period and bowel obstruction, fistula formation and urinary complications in the late period. The complications encountered are as shown below.

S.No	Complications	Number of patients	Percentage
1.	Abdominal Wound Infection	19	48.7
2.	Perineal Wound Infection	21	53.8
3.	Abdominal wound dehiscence	12	30.7
4.	Perineal wound dehiscence	6	15.3
5.	Burst abdomen	6	15.3
6.	Intestinal obstruction	2	5.1
7.	Fistula	2	5.1
8.	Urinary tract infection	17	43.5
9.	Electrolyte imbalance	5	12.8
10.	Reoperations	9	23.0
11.	Perioperative mortality	0	0

12.	Recurrences	4	10.2



Out of the 39 patients, 12 patients did not experience any complication. The overall morbidity was 69.2%. The high complication rate observed in our series is due to the fact that majority of these patients were operated after chemotherapy and/or radiotherapy. The nutrition status of these patients was also poor and these factors contributed to the poor wound healing and the operative complications. However none of our patients died in the immediate postoperative period and the perioperative mortality was 0% in our series.

Reoperations were required for 8 patients (20.5%). Out of these, 6 patients underwent relaparotomy and secondary suturing for burst abdomen. All these patients had received radiotherapy prior to surgery. 1 patient underwent revision of urinary conduit, 1 patient underwent laparotomy and exclusion of the bowel segment for enteroperineal fistula and 1 patient underwent gluteal advancement flap for wound dehiscence. This patient had undergone extended pelvic exenteration for carcinoma rectum infiltrating the sacrum.

The high complication rate observed in our series is concordant with similar series reported. In the literature, it is observed that the potential complications after pelvic exenteration are numerous and almost every patient develops at least one complication. Approximately 40-50% experience a major complication requiring further diagnostic and therapeutic procedures. The operative mortality rate is 2-5% in modern series. The major early postoperative complications include blood loss, sepsis, wound dehiscence, and anastamotic breakdown at the level of the bowel, urinary pouch, or ureteral sites. The rate of late complications is lower, but approximately one third of patients experience fistula, bowel obstruction, ureteral strictures, renal failure, pyelonephritis, and chronic bowel obstructions. Other complications include deep venous thrombosis and pulmonary emboli, flap necrosis, and stomal necrosis.

The complications of urinary diversion procedure include electrolyte abnormalities leading to hyperchloremic metabolic acidosis in ileal or colonic conduits and hyponatremic hyperkalemic metabolic acidosis in jejunal conduits, nephrolithiasis, nutritional complications due to removal of substantial length of bowel segment in continent pouches, adenocarcinoma in 40% of patients with ureterosigmoidostomy,

decreased urinary output, urinary leak, ureteral stricture, urinary incontinence, and infections.

Orthotopic urinary diversions are becoming increasingly popular. It was initially performed successfully in men. It is now being successfully performed in women too. A potential candidate for an orthotopic neobladder must have an intact external urethral sphincter to provide continence and allow conscious voiding through the urethra. Exenterative procedures including the vulva eliminate the possibility of orthotopic urinary diversion.

Most of the 30 day mortality , as high as 20% in the 1950's was caused by postoperative septic complications and the impact of radiation enteritis on small intestinal loops caught in the empty and denuded pelvic cavity, resulting in frequent episodes of intestinal obstruction and fistulas. The contemporary experience with exenterative pelvic surgery suggest that morbidity from this operation remains high, whereas operative mortality has decreased to less than 5%. Preserving the nutritional status of these patients, modern imaging permitting non operative management of intra abdominal sepsis, decreasing reoperation rates, which contributed to increased mortality in previous decades.

Morbidity and mortality of pelvic exenteration				
Series	**Years**	**No.of patients**	**Morbidity**	**Mortality**
Lopez&Monafo	1993	232	45%	14%
Perlman	1994	77	38%	5%
Hockel et al	1996	48	33%	0%
Goldberg et al	1998	154	47%	14%
Law et al	2000	24	54%	0%
Chen HS et al	2001	50	37%	2%
Wig et al	2002	47	38.29%	13%
Ike et al	2003	45	77.8%	13.3%
Poletto et al	2004	96	15.6%	19.8%
Present Study	**2007**	**39**	**69.2%**	**0%**

Disease recurrence was noted in 4 patients (10.2%). Out of these, 3 patients (7.7%) had local recurrence and 1 patient (2.5%) had distant recurrence. The median disease free interval in those patients who developed local recurrence was 27.3 months. The disease free interval in the patient who developed distant recurrence was 14 months. This patient developed lung metastases and received palliative chemotherapy. Recurrence was detected by CT scan done for symptoms of lower abdominal pain and the distant recurrence was detected on routine annual radiograph.

In a recent publication, Stab and colleagues have demonstrated that PET has an accuracy of 87% in detecting pelvic recurrence. The clinical value of FDG-PET for primary staging in cervical cancer seems promising .A few retrospective studies have investigated FDG-PET as routine post treatment surveillance or to determine whether various

clinical situation suspicious of recurrence are true recurrences . A study by Rower et al has prospectively investigated the role of PET in 27 patents with unexplained elevation of SCC- Ag levels [MRI and/or CT normal or inconclusive] .PET findings were positive for 19 of them, of which 17 were conformed to have recurrence, and such expedited detection of recurrent cervical cancer led to positive effects on patients survival. In another prospective trial, the diagnostic efficacy and benefit of PET restaging in documented recurrent cervical cancer was evaluated. A total of 55% patients had treatment modified due to PET findings.

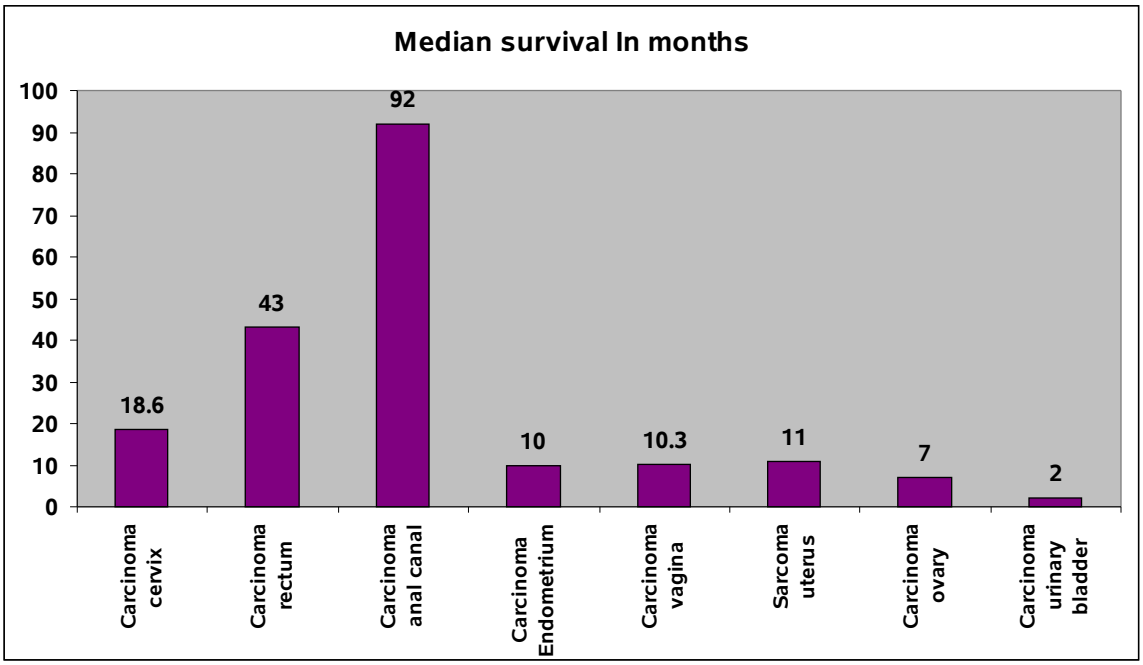
There has been no consensus regarding appropriate follow-up schedules. Soisson et al investigated clinical parameters in the detection of recurrent cervical carcinoma after radical hysterectomy. And they found vaginal cytology had a sensitivity of 13 and 100% and pelvic examination 58 and 96%. Vaginal cytology is not cost effective or sensitive. It is less useful in post-radiation situations.

Out of the 39 patients in our series, 10 patients (25.6%) died during follow up. The median survival in these patients was 11.4 months. Out of the remaining 29 patients, 3 patients were lost to follow up and the remaining 26 patients are on regular follow up. The longest survival noted is 144 months in a case of carcinoma rectum who had undergone posterior pelvic exenteration.

The median survival observed in our series was 27.2 months. Site wise analysis showed that best outcome was seen in patients with carcinoma rectum. Patients with carcinoma

cervix had poorer results compared to rectum. The number of patients in the other sites is too low to comment on the outcome. The site-wise median survival is as shown below.

S.No	Diagnosis	Number of Patients	Median survival In months
1.	Carcinoma cervix	18	18.6
2.	Carcinoma rectum	11	43
3.	Carcinoma anal canal	2	92
4.	Carcinoma Endometrium	2	10
5.	Carcinoma vagina	3	10.3
6.	Sarcoma uterus	1	11
7.	Carcinoma ovary	1	7
8.	Carcinoma urinary bladder	1	2



Apart from the site of the disease, presence of nodal metastases also was a poor prognostic indicator. Similar difference in outcome is seen in studies reported in the literature. In colorectal cancer, tumor invasion of adjacent viscera is prognostically more favorable than tumors confined to bowel wall, with metastasis to lymph nodes. Among

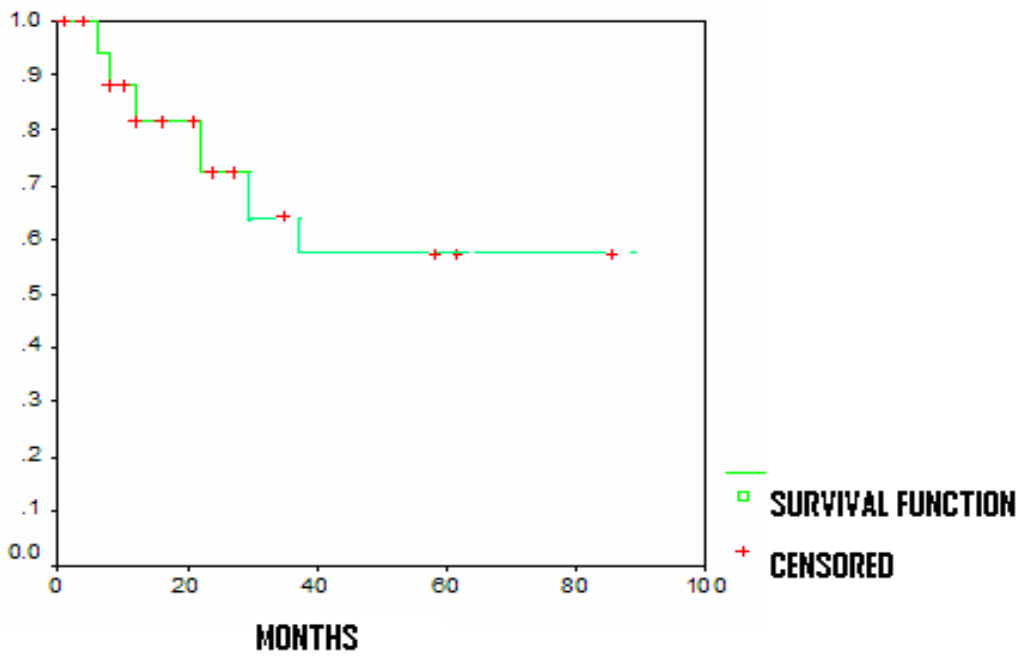
86 cases of multivisceral resections for colorectal cancer, more than 80% had histological evidence of adjacent organ invasion, but in less than 30% were metastases found in the regional lymph nodes. The 5 year survival in this group of patients was 76%, despite the locally advanced T stage. Similar findings were reported in a small group of patients treated with total pelvic exenteration for rectal cancer and in another study after resection of portions of the bony pelvis, the so called composite pelvic exenteration, was performed.

Recurrent endometrial carcinoma has been treated with pelvic exenteration in which the disease is limited to the central pelvis. Barber and Brunschwig reported a 5 year survival rate of 14.5% after the procedure, a result that is less favorable than that for carcinoma of cervix. In the series of Reid et al, however 9 out of 46 patients with sarcoma of vagina, cervix or uterus underwent pelvic exenteration with a 5 year survival rate of 55%.

In the series reported by Hopkins and Morley, 4% of all patients with vulvar cancers underwent pelvic exenteration for extension of the disease to the urethra, base of the bladder, anus, or rectum; their 5 year survival was 60% although metastatic disease in lymph nodes markedly decreases their life expectancy.

The 5 year survival was calculated using Kaplan Meier method and the estimated 5 year survival in our series was 58.7%. This is in concordance with the results published by other studies in the literature. Reported 5-year survival rates after pelvic exenteration ranged from 23-61%

KAPLAN MEIER CURVE



The most common site of recurrence is the pelvis. Poor prognostic factors associated with recurrence after exenteration include tumor size greater than 3 cm, pelvic sidewall or resection margin involvement, nodal metastasis, and time interval of less than 1 year from prior radiation treatment. Recent data suggest that local failures after pelvic exenterations are still at an average of 20%. When tumour extent requires a composite pelvic exenteration, the recurrence rate increases to approximately 30%, as reported by Gonzalez and associates. Unfaourable tumour biology, nonaxial tumour recurrence, poor patient selection, previous extensive surgery, and surgical inexperiences are all unfavourable prognostic indicators.

Series	Year	Primary tumour	No.of patients	5-year survival
Hockel et al	1996	Gynaecologic	48	44%
Meterissian et al	1997	Rectum	40	49%
Hida et al	1998	Rectum	50	64%
Law et al	2000	Rectum	24	44%
Zhang et al	2000	Gynaecologic	18	15%
Chen et al	2001	Rectum	50	49%
Poletto et al	2004	Mixed	96	41.9%
Present Study	**2007**	**Mixed**	**39**	**58.7%**

CONCLUSION

The indolent behavior of certain pelvic cancers is what makes pelvic exenteration a feasible procedure for the cure of locally advanced neoplasms. Pelvic exenteration today must be viewed in the context of a salvage operation aimed at a potential cure, not primarily as a palliative effort.

This daunting procedure must be performed by surgeons experienced in multivisceral resections, in an environment in which pelvic reconstruction, patient rehabilitation, and interdisciplinary cancer care are provided with the leadership of surgeons who understand and embrace multimodal treatment of patients with cancer. Several recent publications attest to the increasing use of this procedure internationally.

Our analysis shows that the procedure can be done with acceptable complications and is the only curative hope in selected patients. Though organ preservation and minimal approach surgery is the recent trend in surgical management, there exists a small but definite place for this procedure in the surgical management of locally advanced pelvic tumors who have exhausted all other modalities of treatment.

Though there was no dedicated counseling team or separate stoma therapists in our hospital, still our analysis shows that more patients are willing to understand the magnitude of this surgery and come forward to undergo the surgery. The good five year survival seen in our analysis which is in par with the western studies, shows that our

patients can also tolerate this extensive surgery despite differences in nutritional and socioeconomic status and lack of good rehabilitation.

However the morbidity in our series was high owing to multiple factors. The poor nutritional status, lack of personal hygiene, previous irradiation and nosocomial infections are some of the factors that have contributed to this high complication rate. Efforts to reduce these complications and evolving techniques to avoid stomas and introduction of newer techniques such as IOERT and CORT would help in applying pelvic exenterations to more number of patients.

Pelvic exenteration remains a challenging procedure with significant morbidity. The operation has evolved along with imaging, perioperative care, and adjuvant therapy.
In carefully selected patients, pelvic exenteration provides curative form of treatment and long term survival. Improvements in imaging and selection of patients, advancements in radiotherapy techniques and good rehabilitation in future will increase the number of patients benefited with this procedure.

Pelvic exenteration has retained its place in the armamentarium of surgeons with interest in pelvic cancer surgery. Bricker said it well in his last contribution to the surgical literature *"ordinarily after 40 years, a new operation will have been discarded or so modified and improved that its origin becomes unrecognizable and is forgotten. The fact that there is still a place for the comparatively simple concept behind the early operation- and the knowledge that it still serves a useful purpose- is a great boost to my ego".*

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PROFORMA

ROLE OF EXENTERATIVE SURGERY IN LOCALLY ADVANCED PELVIC TUMOURS

NAME: ADDRESS:

C.D NO:
AGE:
SEX: M/F
OCUPATION:
PH.NO:

DIAGNOSIS:

PRIMARY/RESIDUAL/RECURRENCE

COMPLAINTS AND DURATION:

ABDOMINAL PAIN: Y/N

ABDOMINAL MASS: Y/N

ABDOMINAL DISTENSION: Y/N

WHITE DISCHARGE: Y/N

VAGINAL BLEEDING: Y/N
POST MENOPAUSAL/POSTCOITAL

URINARY SYMPTOMS: Y/N
FREQUENCY/RETENTION/INCONTINENCE/HAEMATURIA/DYSURIA

ALTERED BOWEL HABITS: Y/N
DIARRHOEA/CONSTIPATION/BLEEDING PR/INCONTINENCE

LOW BACK ACHE: Y/N
:
SWELLING OF FEET: Y/N R/L/BIL

LOSS OF APPETITE Y/N

LOSS OF WEIGHT: Y/N

PREVIOUS H/O TREATMENT: Y/N

MONTH AND YEAR OF DIAGNOSIS:

DIAGNOSIS AND STAGE AT THAT TIME:

CERVIX: IA1/IA2/IB1/IB2/IIA/IIB/IIIA/IIIB/IVA/IVB

BLADDER:T N M

RECTUM: T N M

PROSTATE: T N M

UTERUS:IA/IB/IC/IIA/IIB/IIIA/IIIB/IIIC/IVA/IVB

OVARY:IA/IB/IC/IIA/IIB/IIC/IIIA/IIIB/IIIC/IVA/IVB

OTHERS:

HISTOPATHOLOGICAL TYPE:
ADENOCARCINOMA/SQUAMOUS CELLCARCINOMA/SARCOMA/MELANOMA

GRADE:I/II/III

TREATMENT GIVEN:

RADIOTHERAPY:EBRT/BRACHYTHERAPY/BOTH

TOTAL DOSE:

NO.OF FRACTIONS:

INTERVAL BETWEEN EBRT&BRACHY

CHEMOTHERAPY:Y/N

DRUG: CISPLATIN/5FU/ADRIAMYCIN/PACLITAXEL/CARBOPLATIN/OTHERS
NO. OF CYCLES:

PREVIOUS SURGERY:

PANHYSTERECTOMY/ EXTENDED HYSTERECTOMY : TYPEI/II/III/IV/V
ANTERIOR RESECTION/ APR
PARTIAL CYSTECTOMY/RADICAL CYSTECTOMY
RADICAL PROSTATECTOMY

FAMILY H/O CANCER:Y/N
IF YES, DEGREE OF RELATIONSHIP: $1^{ST}/2^{ND}/3^{RD}$

H/O CANCER IN SPOUSE/SEXUAL PARTNER: Y/N

H/O STD IN SEXUAL PARTNER: Y/N

PREMENOPAUSAL/POSTMENOPAUSAL

SMOKER/NON SMOKER

ALCOHOLIC/ NONALCOHOLIC

VEG/NON VEG

MARITAL STATUS:MARRIED/UNMARRIED

AGE AT SEXUAL ACTIVITY:

NO. OF CHILDREN:

CO-MORBID CONDITIONS:DM/HTN/IHD/COPD/TB

CLINICAL EVALUATION:

PERFORMANCE STATUS(ECOG):I/II/III/IV

BUILD:OBESE/MODERATE/THIN

NUTRITION:WELL/MODERATE/ILL

PAEDAL OEDEMA: Y/N
UNILATERAL/BILATERAL
PITTING/NON PITTING

ASCITES: Y/N

LYMPHADENOPATHY: Y/N
ILIAC/INGUINAL/PARA-AORTIC/SUPRACLAVICULAR

ORGAN INVOLVED:

CERVIX/VAULT:

SIZE OF THE LESION: <4 CMS / > 4 CMS
FORNIX INVOLVEMENT: Y/N
ANTERIOR/POSTERIOR/RT. LATERAL/ LT.LATERAL

PARAMETRIA:
RIGHT: SUPPLE/NODULAR/THICKENED
LEFT: SUPPLE/NODULAR/THICKENED

MOBILITY: Y/N

SIDE WALLS: Y/N

BLADDER INVOLVEMENT: Y/N

VESICO VAGINAL FISTULA: Y/N

RECTAL INVOLVEMENT: Y/N

RECTO VAGINAL FISTULA: Y/N

VAGINAL INVOLVEMENT: UPPER 1/3 / UPPER 2/3 / LOWER 1/3 /NIL

NODES: ILIAC/INGUINAL/PARA-AORTIC/SUPRACLAVICULAR

RECTUM:

TYPE OF LESION: ULCERATIVE/PROLIFERATIVE

SIZE: CMS.

DISTANCE FROM ANAL VERGE: CMS.

SPHINCTER INVOLVEMENT: Y/N

MOBILITY: Y/N

ADJACENT STRUCTURE INVOLVEMENT: Y/N
BLADDER/ UTERUS/URETERS/PROSTATE/SACRUM/SIDE WALLS

NODES: ILIAC/INGUINAL/PARA-AORTIC/SUPRACLAVICULAR

LIVER SECONDARIES: Y/N

BLADDER:

SIZE OF THE LESION: CMS

SITE:

ADJACENT STRUCTURE INVOLVEMENT: Y/N
RECTUM/ UTERUS/URETERS/PROSTATE/SACRUM/SIDE WALLS

NODES: ILIAC/INGUINAL/PARA-AORTIC/SUPRACLAVICULAR

LIVER SECONDARIES: Y/N

UTERUS:

SIZE OF THE LESION: CMS

PARAMETRIA:
RIGHT: SUPPLE/NODULAR/THICKENED
LEFT: SUPPLE/NODULAR/THICKENED

ADJACENT STRUCTURE INVOLVEMENT: Y/N
CERVIX/VAGINA/RECTUM/ BLADDER/URETERS/PROSTATE/SACRUM/SIDE WALLS

NODES: ILIAC/INGUINAL/PARA-AORTIC/SUPRACLAVICULAR

INVESTIGATIONS:

HB% BLOOD GROUP:A1/A2/B/A1B/A2B/AB/O RH: +/-
BLOOD UREA: BLOOD SUGAR: SR.CREATININE:

CHEST X-RAY: NORMAL/ SECONDARIES

USG ABDOMEN:

ORGAN : CERVIX/BLADDER/RECTUM/PROSTATE/UTERUS/OVARY/OTHERS
SIZE OF THE LESION:
SOLID/CYSTIC/MIXED
ASCITES:Y/N
HYDRONEPHROSIS:R/L/BIL/NO
NODES: ILIAC/INGUINAL

CT SCAN ABDOMEN &PELVIS:

ORGAN: CERVIX/BLADDER/RECTUM/PROSTATE/UTERUS/OVARY/OTHERS
SIZE OF THE LESION:
HYDRONEPHROSIS:R/L/BIL/NO
NODES: ILIAC/INGUINAL/PARA-AORTIC/MESENTERIC

FAT PLANE BETWEEN:
MALE: BLADDER//RECTUM
FEMALE:BLADDER//UTERUS//RECTUM

CT CHEST:NORMAL/ SECONDARIES

MRI:
ORGAN: CERVIX/BLADDER/RECTUM/PROSTATE/UTERUS/OVARY/OTHERS
SIZE OF THE LESION:
NODES: ILIAC/INGUINAL/MESENTERIC/PARA-AORTIC

CYSTOSCOPY: NORMAL/DISEASED
SIZE OF THE LESION:
SITE:TRIGONE/LATERAL WALLS/DOME
NO. OF LESIONS:
TYPE OF LESION: ULCERATIVE/PROLIFERATIVE
ASSOCIATED CA.IN SITU:
URETERIC ORIFICE:NORMAL/DILATED/OBSTRUCTED
BIOPSY TAKEN:Y/N

SIGMOIDOSCOPY/COLONOSCOPY:
LESION: Y/N
SIZE OF THE LESION:
TYPE OF THE LESION:ULCERATIVE/PROLIFERATIVE
DISTANCE FROM ANAL VERGE:
PASSAGE OF SCOPE BEYOND THE LESION: Y/N
SYNCHRONOUS LESIONS: Y/N
BIOPSY TAKEN: Y/N

OTHER INVESTIGATIONS IF ANY:

HISTOPATHOLOGY:
SIZE OF TUMOUR: CMS
TYPE:SQUAMOUS/ADENO/UNDIFFERENTIATED/TRANSITIONAL/SARCOMA/ MELANOMA/OTHERS

GRADE:I/II/III

ORGANS INVOLVED:

CERVIX:ENDO/ECTO

UTERUS:ENDOMETRIUM/INNER ½ MYOMETRIUM/OUTER ½MYOMETRIUM/ENDO CERVIX/CERVIX STROMAL INVASION/SEROSA/ADNEXA/VAGINA/BLADDER MUCOSA/BOWEL MUCOSA
TUBES:

OVARY:R/L

BLADDER:NON INVASIVE PAPILLARY/IN SITU/SUBEPITHELIAL/INNER ½ MUSCULARIS/OUTER ½ MUSCULARIS/BEYOND MUSCULARIS/PROSTATE/VAGINA/UTERUS

RECTUM:SUBMUCOSA/MUSCULARIS PROPRIA/PERI RECTAL

SIGMOID: SUBMUCOSA/MUSCULARIS PROPRIA/PERI COLIC

PROSTATE:< ½ OF 1 LOBE/ > ½ OF 1 LOBE/ BOTH/EXTRACAPSULAR/SEMINAL VESICLE/BLADDER NECK/EXTERNAL SPHINCTER/RECTUM

OTHER STRUCTURES REMOVED IF ANY:

MARGINS:+/-/CLOSE

LYMPHOVASCULAR INVASION: Y/N

NODES:ILIAC/PERIRECTAL/MESENTERIC

NO.OF NODES RESECTED:

NO. NODES POSITIVE:

EXTRACAPSULAR DISEASE: Y/N

CYSTOSCOPIC BIOPSY:+/-

SIGMOIDO/COLONOSCOPIC BIOPSY:+/-

TREATMENT:

PRE-OP:RT/CT/NIL

RADIOTHERAPY:
TOTAL DOSE:
NO.OF FRACTIONS:
DOSE PER FRACTION:

CHEMOTHERAPY:
DRUG USED:
NO.OF CYCLES:

SURGERY:

INTERVAL BETWEEN PRE-OP TREATMENT AND SURGERY:

FINDINGS DURING SURGERY:

ASCITES/PERITONEAL DISEASE/PARA-AORTIC NODES/LIVER SEC/PARAMETRIUM/SIDE WALLS

FROZEN SECTION : PARA AORTIC NODE:+/-

TYPE OF SURGERY:

EXTENDED HYSTERECTOMY:I/II/III/IV/V
TYPE OF EXENTERATION:ANTERIOR/POSTERIOR/TOTAL/EXTENDED/MODIFIED
RADICAL CYSTECTOMY
RADICAL PROSTATECTOMY
ANTERIOR RESECTION
APR
BOWEL RESECTIONS IF ANY:

ANASTAMOSIS:STAPLER/MANUAL

RECONSTRUCTION:
CONTINENT/NON CONTINENT
ILEAL CONDUIT/COLONIC CONDUIT
COLOSTOMY
ILEOSTOMY
RECONSTRUCTION OF VAGINA: Y/N

COMPLICATIONS: Y/N
WOUND INFECTION: Y/N
WOUND DEHISCENCE: Y/N
FISTULAS:ENTERIC/URETERO VAGINAL/VESICO VAGINAL/RECTO VAGINAL/RECTO VESICAL
COLOSTOMY: HERNIA/STENOSIS
ILEOSTOMY:STENOSIS Y/N
BOWEL OBSTRUCTION: Y/N
URINARY INFECTION: Y/N
HYDRONEPHROSIS: Y/N
DETERIORATING RENAL FN: Y/N
ELECTROLYTE IMBALANCE: Y/N
PELVIC ABSCESS: Y/N
VAGINAL DISCHARGE: Y/N
THROMBOEMBOLISM: Y/N
UROLITHIASIS: Y/N

DISCHARGED/EXPIRED

FOLLOW-UP

PARAMETERS:	DATE			
	1'ST	2'ND	3'RD	4'TH
LOCAL RECURRENCE				
SOFT TISSUE RECURRENCE				
ILIAC NODES				
INGUINAL NODES				
PARAAORTIC NODES				
SUPRACLAVICULAR NODES				
ASCITES				
LUNG SECONDARIES				
RENAL PARAMETER ELEVATION				
WEIGHT GAIN IN KGS.				

S. No	Name	Age	Sex	Diagnosis	Stage At Diagnosis	Initial Treatment	Indication for Exenteration	Type of exenteration	Type of urinary/fecal diversion	Pelvic reconstruction	Postop complications	recurrence	Followup period in months	Status

1	Shanmugavadivu	40	F	Ca rectum	IIB	Preop chemo	residue	PPE	colostomy	omentum	Nil	Nil	137	Alive
2	Suseela	30	F	Ca.rectum	IIIB	Preop chemoradiation	residue	PPE	colostomy	omentum	Nil	Nil	12	Died
3	Sumathi	38	F	Ca rectum	IIB	Pre op chemo	Res	PPE	Colostomy	Nil	Wound Infection	Nil	62	Alive
4	Patchaimuthammal	50	F	Anal canal	III A	Pre op chemoradiation	Res	PPE	Colostomy	Nil	Nil	Nil	108	Alive
5	Nallammal	62	F	Rectum	III B	Preop chemo	Res	PPE	Colostomy	Nil	Wound Infection	Nil	61	Alive
6	Alagiyameenatchi	49	F	Rectum	III A	Chemotherapy	Res	PPE	Colostomy	Omentum	Nil	Nil	6	Alive
7	Mariammal	72	F	Anal canal	III A	Chemoradiation	Rec	PPE	Colostomy	Omentum	Wound Infection	Nil	76	Lost follow up
8	Mariammal	35	F	Cervix	I B	Surgery + RT	Rec	TPE	Wet colostomy	Omentum	Wound Infection + wound dehiscence	Nil	12	Died
9	Sumathi	32	F	Cervix	IIB	RT	Rec	APE	Ileal conduit	Omentum	Wound Infection+ wound dehiscence	Locoregional recurrence	22	Died
10	Alamelu	4	F	Cervix	IIB	RT	Rec	TPE	Wet	Oment	Woun	Nil	36	Lo

		3							colostomy	um	d Infection+ wound dehiscence			st follow up
11	Salima begum	48	F	Cervix	IIIB	chemoradiation	Res	TPE	Wet colostomy	Omentum	Wound Infection+ wound dehiscence	Nil	11	Died
12	Balaganga	42	F	Cervix	IIIB	RT	Rec	APE	Ileal conduit	Omentum	Nil	Nil	10	Died
13	Palaniammal	45	F	Cervix	IIIB	RT	Rec	APE	Ileal conduit	Omentum	Wound Infection	Nil	27	
14	Murugan adam	21	M	Rectum	III B	Chemoradiation	Res	CPE	Wet colostomy	oment um	Nil	Nil	24	Died
15	Rani	52	F	Cervix	IIB	RT	Rec	APE	Ileal conduit	Omentum	Nil	Nil	36	Lost follow up
16	Biyula	43	F	Uterine sarcoma	IV A	Nil	Primary	APE	Ileal conduit	Omentum	Wound Infection	Nil	11	Alive
17	Thara bai	45	F	Cervix	IIB	RT	Rec	APE	Ileal conduit	Omentum	Wound Infection+ wound dehisc	Nil	36	Alive

											ence			
18	Anusuya	39	F	Cervix	IIIB	RT	Rec	APE	Ileal conduit	oment um	Wound Infection + perineal fistula	Locoregional recurrence	42	Alive
19	Kalaivani	40	F	Endometrium	II B	RT	Res	MPE	Nil	Omentum	Wound Infection	Nil	8	Alive
20	Anjalai	37	F	Cervix	II A	Surgery + RT	Rec	APE	Ileal conduit	Omentum	Wound Infection+ wound dehiscence	Local recurrence	18	Alive
21	Dhanalakshmi	35	F	Cervix	IIB	RT	Rec	TPE	Wet colostomy	Omentum	Nil	Pulmonary metastases	14	Alive
22	Chitra devi	49	F	Cervix	IIB	RT	Rec	APE	Ileal conduit	Omentum	Wound Infection+ wound dehiscence	Nil	5	Died
23	Chandra	45	F	Vagina	IV A	Nil	Primary	APE	Ileal conduit	Omentum	Wound Infection	Nil	18	Alive
24	Mary	45	F	Cervix	I B	Surgery + RT	Rec	APE	Ileal conduit	Omentum	Wound Infection	Nil	18	Alive
25	Muniam	5	F	Cervix	IIIB	RT	Res	TPE	Colost	Oment	Woun	Nil	18	Ali

	mal	0							omy + Ileal conduit	um	d Infection			ve
26	Indira	63	F	Rectum	II A	Chemoradiation	Rec	MPE	Nil	Omentum	Wound Infection	Nil	12	Alive
27	Nagabhooshanam	39	F	Cervix	IIB	RT	Rec	TPE	Wet colostomy	Omentum	Nil	Nil	4	Died
28	Vanaja	54	F	Cervix	IIIB	RT	Res	TPE	Colostomy + Ileal conduit	Omentum	wound dehiscence + perineal fistula	Nil	12	Died
29	Murugayee	50	F	Urinary bladder	III	Nil	Primary	APE	Ileal conduit	Omentum	Wound Infection	Nil	2	Died
30	Saraswathi	40	F	Cervix	IB2	RT	Res	TPE	Wet colostomy	Omentum	Wound Infection	Nil	7	Alive
31	Bujjammal	58	F	Endometrium	IIIB	RT	Res	APE	Ileal conduit	Omentum	Wound Infection+ wound dehiscence	Nil	12	Alive
32	Govindasamy	70	M	Rectum	IIIB	Chemoradiation	Res	TPE	Wet colostomy	Omentum	wound dehiscence	Nil	6	Alive
33	Prema	55	F	Vagina	III	RT	Res	APE	Ileal conduit	Omentum	Nil	Nil	7	Alive
34	Rajamma	6	F	Cervix	IIIB	RT	Rec	APE	Ileal	Oment	Nil	Nil	7	Ali

	l	0							conduit	um				ve
35	Kothandaraman	64	M	Rectum	IV	Chemoradiation	Res	TPE	Wet colostomy	Omentum	Wound dehiscence	Nil	8	Alive
36	Prema	55	F	Vagina	IV	RT	Res	APE	Ileal conduit	Omentum	Wound dehiscence	Nil	6	Alive
37	Rakeelammal	70	F	Rectum	III A	RT	Res	PPE	Colostomy	Omentum	Nil	Nil	144	Alive
38	Amaravathi	62	F	Ovary	III C	Chemotherapy + Surgery	Rec	MPE	Nil	oment um	Nil	Nil	7	Alive
39	chandrasekaran	61	M	Rectum	III B	chemoradiation	Res	TPE	Wet colostomy	Omentum	Wound infection	Nil	1	Alive